

LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Map books

Sound, noise and vibration - West Midlands Metropolitan (*Part 4 of 4*)

November 2013

ES 3.5.1.9.4



Department
for Transport

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Map series description	<p>SV-01 presents the predicted operational sound from the new railway.</p> <p>The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.</p>	<p>SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.</p> <p>The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.</p>	<p>The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-003 and Volume 5: Appendix SV-002.</p> <p>The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.</p>	<p>The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004 and Volume 5: Appendix SV-002.</p> <p>The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.</p>
Community Forum Area name				
CFA 23 – Balsall Common and Hampton-in-Arden	✓	✓	✓	✓
CFA 24 – Birmingham Interchange and Chelmsley Wood	✓	✓	✓	✓
CFA 25 – Castle Bromwich and Bromford	✓	✓	✓	✓
CFA 26 – Washwood Heath to Curzon Street	✓	✓	✓	✓

Mapping explanatory notes

Copyright statements

Copyright statements are presented in the data dictionary and definitions section at the front of the map book, due to limited space to include this on the individual maps themselves.

Ordnance Survey data

All maps produced as part of the London-West Midlands Environmental Statement (ES) contain Ordnance Survey (OS) data. HS2 Ltd uses the most up-to-date mapping available, where possible, supplied by the OS. As such, we cannot be held responsible for any inaccuracies within this data.

As part of our licence conditions, all digital maps carry a watermark.

Chainage

Most of the maps presented as part of the ES have a chainage value shown next to the alignment. Chainage is presented on the maps in black font, in the form of XX+YYY, for example: 77+000.

Chainage (known as reference chainage) is referenced from Euston station, which is 0+000, and the value presented is in metres. For example, 77+000 refers to the point 77,000m, or 77km, from Euston station. Chainage values increase in intervals dependant on the map scale. For maps at 1:50,000, scale chainage is shown at 5km intervals. For maps at 1:25,000, scale chainage is shown at 2km intervals. For maps at 1:10,000, 1:5,000 and 1:2,500 scales, chainage is shown at 1km intervals.

Chainage has been included on the maps as a useful tool for comparing map sets showing the different environmental themes or engineering plans, due to map sets having different scales and therefore showing differing amounts of alignment on the map.

Map orientation

The majority of the maps presented in these map books are presented with the railway alignment running horizontally across the page. The direction of travel to London would be following the alignment to the right hand side of the page, and the West Midlands to the left.

The exceptions to this are map series LV-02, LV-03, LV-04, LV-07 and LV-08, which present the alignment running from the bottom to the top of the page. This is to allow more of the modelled outputs to be shown at the appropriate map scale. In this instance, the direction of travel to London would be to the bottom of the page, and the West Midlands to the top.

Map books

There are a total of 76 map books in the ES, spread across Volumes 2, 4 and 5. A list of the titles is provided in the table below for reference.

Name	Name
Volume 2 Map Books Community Forum Area: 01 Euston – Station and Approach	Volume 5 Map Books: Ecology – Community Forum Area: 05 Northolt Corridor
Volume 2 Map Book s Community Forum Area: 02 Camden Town and HS1 Link	Volume 5 Map Books: Ecology – Community Forum Area: 06 South Ruislip to Ickenham
Volume 2 Map Books Community Forum Area: 03 Primrose Hill to Kilburn (Camden)	Volume 5 Map Books: Ecology – Community Forum Area: 07 Colne Valley
Volume 2 Map Books Community Forum Area: 04 Kilburn (Brent) to Old Oak Common	Volume 5 Map Books: Ecology – Community Forum Area: 08 The Chalfonts and Amersham
Volume 2 Map Books Community Forum Area: 05 Northolt Corridor	Volume 5 Map Books: Ecology – Community Forum Area: 09 Central Chilterns
Volume 2 Map Books Community Forum Area: 06 South Ruislip to Ickenham	Volume 5 Map Books: Ecology – Community Forum Area: 10 Dunsmore, Wendover and Halton
Volume 2 Map Books Community Forum Area: 07 Colne Valley	Volume 5 Map Books: Ecology – Community Forum Area: 11 Stoke Mandeville and Aylesbury
Volume 2 Map Books Community Forum Area: 08 The Chalfonts and Amersham	Volume 5 Map Books: Ecology – Community Forum Area: 12 Waddesdon and Quainton
Volume 2 Map Books Community Forum Area: 09 Central Chilterns	Volume 5 Map Books: Ecology – Community Forum Area: 13 Calvert, Steeple Claydon, Twyford and Chetwode
Volume 2 Map Books Community Forum Area: 10 Dunsmore, Wendover and Halton	Volume 5 Map Books: Ecology – Community Forum Area: 14 Newton Purcell to Brackley
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Volume 2 Map Books Community Forum Area: 21 Drayton Bassett, Hints and Weeford	Volume 5 Map Books: Ecology – Community Forum Area: 25 Castle Bromwich and Bromford
Volume 2 Map Books Community Forum Area: 22 Whittington to Handsacre	Volume 5 Map Books: Ecology – Community Forum Area: 26 Washwood Heath to Curzon Street
Volume 2 Map Books Community Forum Area: 23 Balsall Common and Hampton-in-Arden	Volume 5 Map Books: Land Quality
Volume 2 Map Books Community Forum Area: 24 Birmingham Interchange and Chelmsley Wood	Volume 5 Map Books: Landscape and Visual – Euston and London Metropolitan
Volume 2 Map Books Community Forum Area: 25 Castle Bromwich and Bromford	Volume 5 Map Books: Landscape and Visual – Country South
Volume 2 Map Books Community Forum Area: 26 Washwood Heath to Curzon Street	Volume 5 Map Books: Landscape and Visual – Country North
Volume 4 Map Books Off Route Effects	Volume 5 Map Books: Landscape and Visual – West Midlands Metropolitan
Volume 5 Map Books: Agriculture, Forestry and Soils	Volume 5 Map Books: Socio-Economic
Volume 5 Map Books: Air Quality	Volume 5 Map Books: Sound, Noise and Vibration – Euston and London Metropolitan
Volume 5 Map Books: Community	Volume 5 Map Books: Sound, Noise and Vibration – Country South
Volume 5 Map Books: Cultural Heritage – Euston and London Metropolitan	Volume 5 Map Books: Sound, Noise and Vibration – Country North
Volume 5 Map Books: Cultural Heritage – Country South	Volume 5 Map Books: Sound, Noise and Vibration – West Midlands Metropolitan
Volume 5 Map Books: Cultural Heritage – Country North	Volume 5 Map Books: Traffic and Transport
Volume 5 Map Books: Cultural Heritage – West Midlands Metropolitan	Volume 5 Map Books: Water Resources – Euston and London Metropolitan
Volume 5 Map Books: Ecology – Community Forum Area: 01 Euston - Station and Approach	Volume 5 Map Books: Water Resources – Country South
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LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Data dictionary and definitions

Data dictionary and definitions

Legend features	Definition	Source	Copyright
Airborne sound and vibration assessment location	Locations near surface sections of the route at which a quantitative assessment of airborne sound and ground-borne vibration impacts due to the operation of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004.	High Speed Two (HS2) Ltd	
Airborne sound assessment location	Locations at which a quantitative assessment of airborne sound impacts due to the operation of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004.	High Speed Two (HS2) Ltd	
Airborne sound, ground-borne sound and vibration assessment location	Locations at which a quantitative assessment of airborne sound, ground-borne sound and vibration impacts due to the operation of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the operational sound & vibration reports contained in Volume 5: Appendix SV-004.	High Speed Two (HS2) Ltd	
Airborne sound study area	This defines the area within which operational airborne sound impacts of the scheme have been quantitatively assessed. This area is defined as within 1km of surface sections of the route in rural areas and within 500m of surface sections of the route in urban areas.	High Speed Two (HS2) Ltd	
Baseline measurement locations	These represent locations at which sound measurements were carried out as part of the baseline sound surveys. Measurements of existing baseline sound levels at these locations have been used to derive baseline sound levels at operational and construction sound assessment locations. These baseline measurement locations are labelled with a reference number which enables cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002, which also describes how these are linked to baseline levels at assessment locations.	High Speed Two (HS2) Ltd	
Committed developments	<p>This informs the assessment of the future baseline.</p> <p>A development consent or allocation that has full or outline planning permission, or is allocated in an adopted development plan.</p>	High Speed Two (HS2) Ltd	© Crown Copyright and database rights 2013 Ordnance Survey Licence Number 100049190.
Community Forum boundary	The Environmental Statement has been split into 26 sections called Community Forum Areas.	High Speed Two (HS2) Ltd	© Crown Copyright and database rights 2013 Ordnance Survey Licence Number 100049190.
Construction airborne sound and vibration assessment location	Locations at which a quantitative assessment of construction noise and vibration impacts of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the construction sound & vibration reports contained in Volume 5: Appendix SV-003.	High Speed Two (HS2) Ltd	
Construction airborne sound assessment location	Locations at which a quantitative assessment of construction noise impacts of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the construction sound & vibration reports contained in Volume 5: Appendix SV-003.	High Speed Two (HS2) Ltd	

Legend features	Definition	Source	Copyright
Construction vibration assessment locations	Locations at which a quantitative assessment of construction vibration impacts of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the construction sound & vibration reports contained in Volume 5: Appendix SV-003.	High Speed Two (HS2) Ltd	
County boundary	County boundaries from Ordnance Survey boundary mapping.	Ordnance Survey	© Crown Copyright and database rights 2013 Ordnance Survey Licence Number 100049190.
Depot, station, headhouse or portal building	Extends to cover operational footprint of each depot and station and the footprint of each tunnel vent shaft and headhouse at surface level. Excludes any ancillary buildings associated with these structures.	High Speed Two (HS2) Ltd	
District/Borough boundary	Ordnance Survey local authority boundary mapping.	Ordnance Survey	© Crown Copyright and database rights 2013 Ordnance Survey Licence Number 100049190.
Engineering earthworks: cutting	Cuttings created in the construction of the railway and associated works such as highways.	High Speed Two (HS2) Ltd	
Engineering earthworks: embankment	Embankments created in the construction of the railway and associated works such as highways.	High Speed Two (HS2) Ltd	
Envisaged measures further reducing noise effects	<p>Other environmental features e.g. landscaping: These lines represent environmental mitigation features provided for reasons other than noise mitigation which also reduce sound levels from the Proposed Scheme to the surrounding environment. These features are not placed specifically to reduce or remove a likely significant noise effect. Examples include landscaping and visual mitigation earthworks (non-engineering earthworks).</p> <p>Engineering e.g. cuttings: These lines represent engineering features which reduce sound levels from the Proposed Scheme to the surrounding environment but are not placed specifically to reduce or remove a likely significant noise effect. Examples include cuttings and safety barriers on viaducts which are not close to sensitive receptors.</p>	High Speed Two (HS2) Ltd	
Envisaged mitigation to avoid/reduce significant noise effects	<p>Landscaping and/or fence barriers: These lines represent the envisaged mitigation provided specifically to reduce sound levels from the Proposed Scheme at sensitive receptors in order to reduce or remove likely operational significant noise effects. Examples include noise fence barriers or earth bunds (non-engineering earthworks) acting as noise barriers. These features are labelled with the height of the top of the barrier/bund above rail level.</p> <p>Engineering e.g. cuttings (green tunnels separately marked): These lines represent engineering features of the route which reduce sound levels from the Proposed Scheme at potentially significant sensitive receptors. These features, therefore, serve a material purpose in reducing or avoiding likely significant noise effects. Examples include engineering cuttings near to sensitive receptors. These features are labelled with the height of the top of the feature above rail level.</p>	High Speed Two (HS2) Ltd	
Ground-borne sound & vibration study area (highly sensitive non-residential)	This defines the area within which direct operational ground-borne sound and vibration impacts of the scheme at highly sensitive non-residential receptors have been quantitatively assessed. This area is defined as within 200m of the route.	High Speed Two (HS2) Ltd	
Ground-borne sound & vibration study area (residential and non-residential)	This defines the area within which direct operational ground-borne sound and vibration impacts of the scheme at residential and non-residential receptors have been quantitatively assessed. This area is defined as within 85m of the route.	High Speed Two (HS2) Ltd	

Legend features	Definition	Source	Copyright
Ground-borne sound and/or vibration assessment location	Locations near tunnelled sections of the route at which a quantitative assessment of ground-borne sound and vibration impacts due to the operation of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the operational sound & vibration reports contained in Volume 5: Appendix SV-004.	High Speed Two (HS2) Ltd	
Minor ground-borne noise or vibration impact	Buildings at which a minor operational ground-borne sound or vibration impact is predicted from the Proposed Scheme.	High Speed Two (HS2) Ltd	
Non-engineering earthworks: cutting	Cuttings created in the construction of landscape features and mitigation measures.	High Speed Two (HS2) Ltd	
Non-engineering earthworks: embankment	Embankments created in the construction of landscape features and mitigation measures.	High Speed Two (HS2) Ltd	
Operational airborne sound impacts at buildings	The buildings shown on SV-02 and SV-05 are colour-coded according to the magnitude of the predicted noise impacts of the Proposed Scheme. Noise impacts are calculated by comparing the sound levels predicted if the Proposed Scheme did not go ahead with those if it did (details of this process can be found in Volume 5: Appendix SV001-000). Panel B on SV-02/SV-05 contains a key showing the colours used with the corresponding impact categories. The impacts presented are the greatest (i.e. worst-case) of the impacts predicted for daytime and night-time.	High Speed Two (HS2) Ltd	
Potential additional noise insulation (triggered by maximum sound levels at night)	This represents dwellings which would potentially be provided with noise insulation due maximum sound levels from the Proposed Scheme (further information regarding assessment criteria can be found in Volume 5 Appendix SV-001).	High Speed Two (HS2) Ltd	
Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)	This represents dwellings which would potentially be provided with noise insulation due to noise from the Proposed Scheme exceeding the World Health Organization (WHO) night noise guidelines interim target (further information regarding assessment criteria can be found in Volume 5 Appendix SV-001).	High Speed Two (HS2) Ltd	
Potential noise insulation (triggered by Noise Insulation Regulations 1996)	This represents dwellings which would potentially qualify for noise insulation under the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (further information regarding assessment criteria can be found in Volume 5 Appendix SV-001).	High Speed Two (HS2) Ltd	
Route in tunnel Route on surface	Represents the proposed route of HS2, split into route on surface and tunnelled sections.	High Speed Two (HS2) Ltd	
Sound contours (SV-01)	The sound levels from the Proposed Scheme (expressed as $L_{pAeq,T}$ and representing sound from the new railway only) are presented in 5dB steps. The levels are shown in the panel in the top-right hand corner of SV-01.	High Speed Two (HS2) Ltd	
Sound contours (SV-02/SV-05)	The sound levels from the Proposed Scheme (expressed as $L_{pAeq,T}$ and representing sound from the new railway only) are presented at two sound levels: 40 dB $L_{Aeq,T\ 23:00\ to\ 07:00}$ and 55 dB $L_{Aeq,T\ 23:00\ to\ 07:00}$. The corresponding daytime levels ($L_{Aeq,T\ 07:00\ to\ 23:00}$) are shown in Panel A of SV-02/SV-05.	High Speed Two (HS2) Ltd	

LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

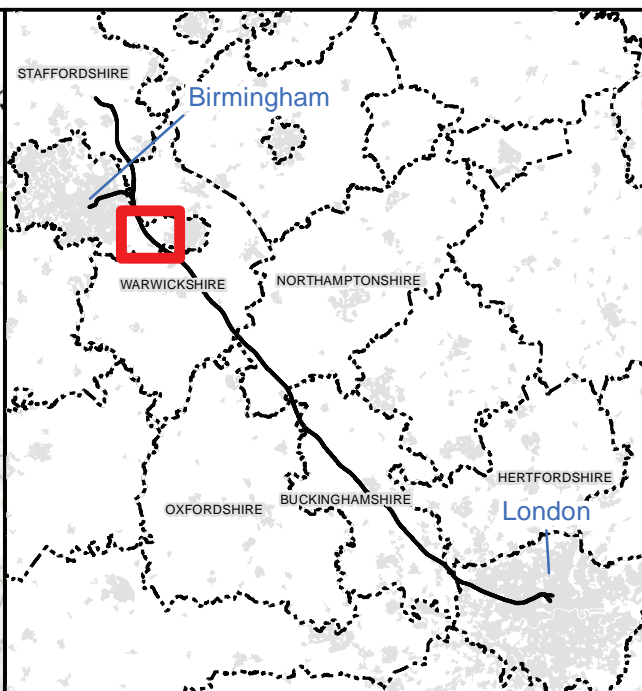
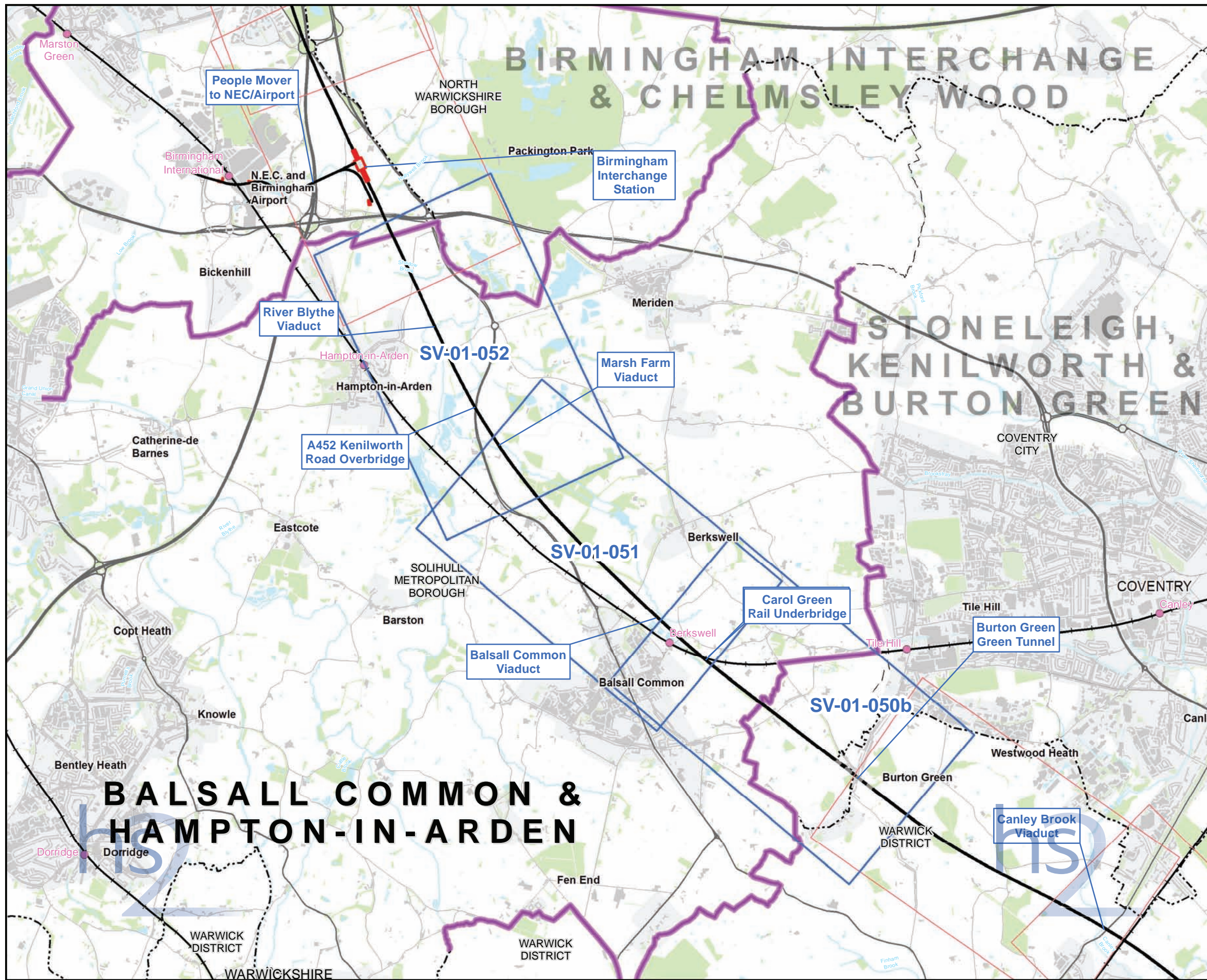
CFA23 | Balsall Common and Hampton-in-Arden

SV-01 - Operational Sound Contour Maps and Likely Significant Effects

SV-02 - Operational Airborne Noise and Vibration Impacts and Likely Significant Effects
(with Assessment Locations)

SV-03 - Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

SV-04 - Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

Route in tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

Existing railway station

County boundary

District/Borough boundary

Map sheets included in this community forum

Map sheets not included in this community forum

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0

500

1,000

1,500

2,000

Metres

Doc Number: C250-ARP-EV-MAP-000-004080--P04.00

Date: 29/10/13

Map Number

SV-01-INDEX-CFA23

Map Name

Index Map of:
Operational Sound Contour Maps and
Likely Significant Effects

Community Forum Area CFA23:
Balsall Common & Hampton in Arden

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500

1,000

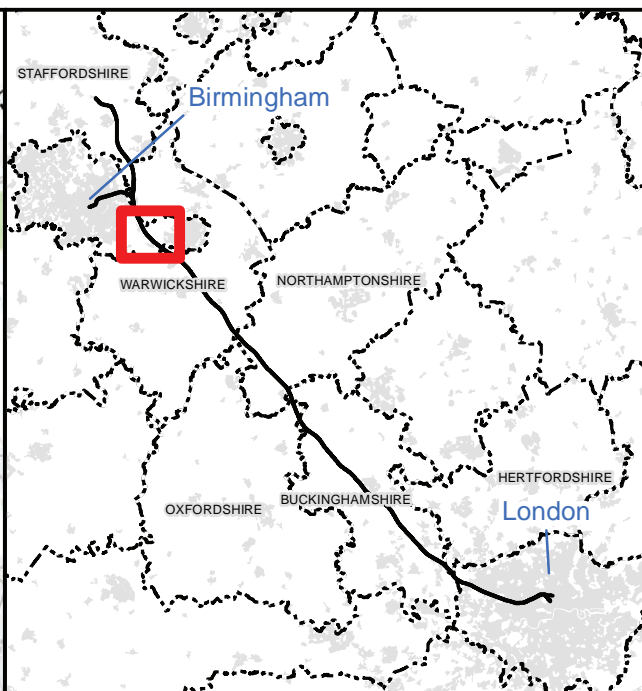
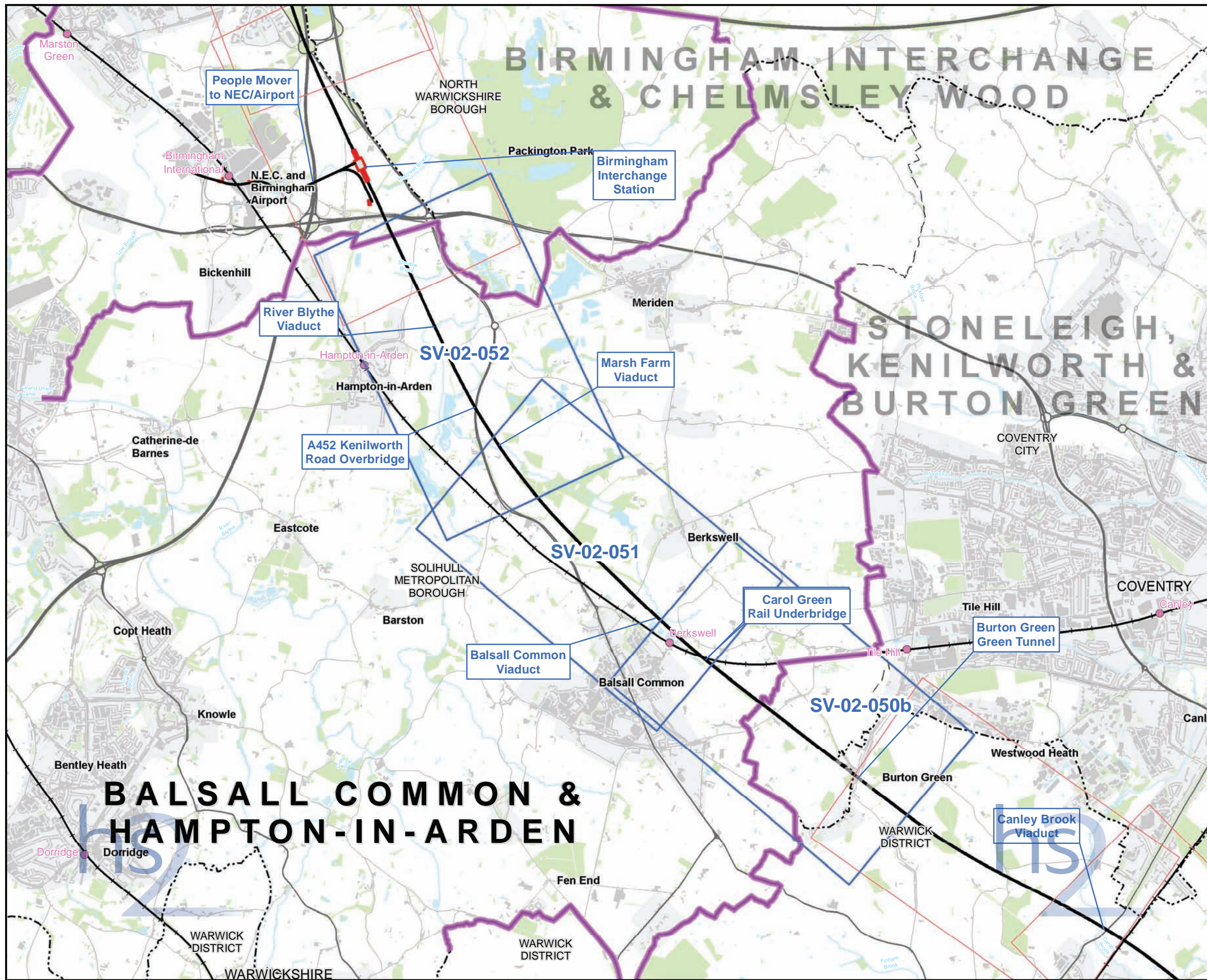
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Doc Number: C250-ARP-EV-MAP-000-004080--P04.00

Date: 29/10/13



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

Key items on the map include the following:

- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
- the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
- sound contours representing sound produced by the new railway (displayed in a simpler manner than on SV-01 in order not to obscure other features on the map series);
- the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
- labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend	
Route in tunnel	Map sheets included in this community forum
Route on surface	Map sheets not included in this community forum
Depot, station, headhouse or portal building	
Community forum boundary	
Existing railway station	
County boundary	
District/Borough boundary	

Map Number	SV-02-INDEX-CFA23
Map Name	Index Map of: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)
	Community Forum Area CFA23: Balsall Common & Hampton in Arden

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Scale at A3: 1:50,000

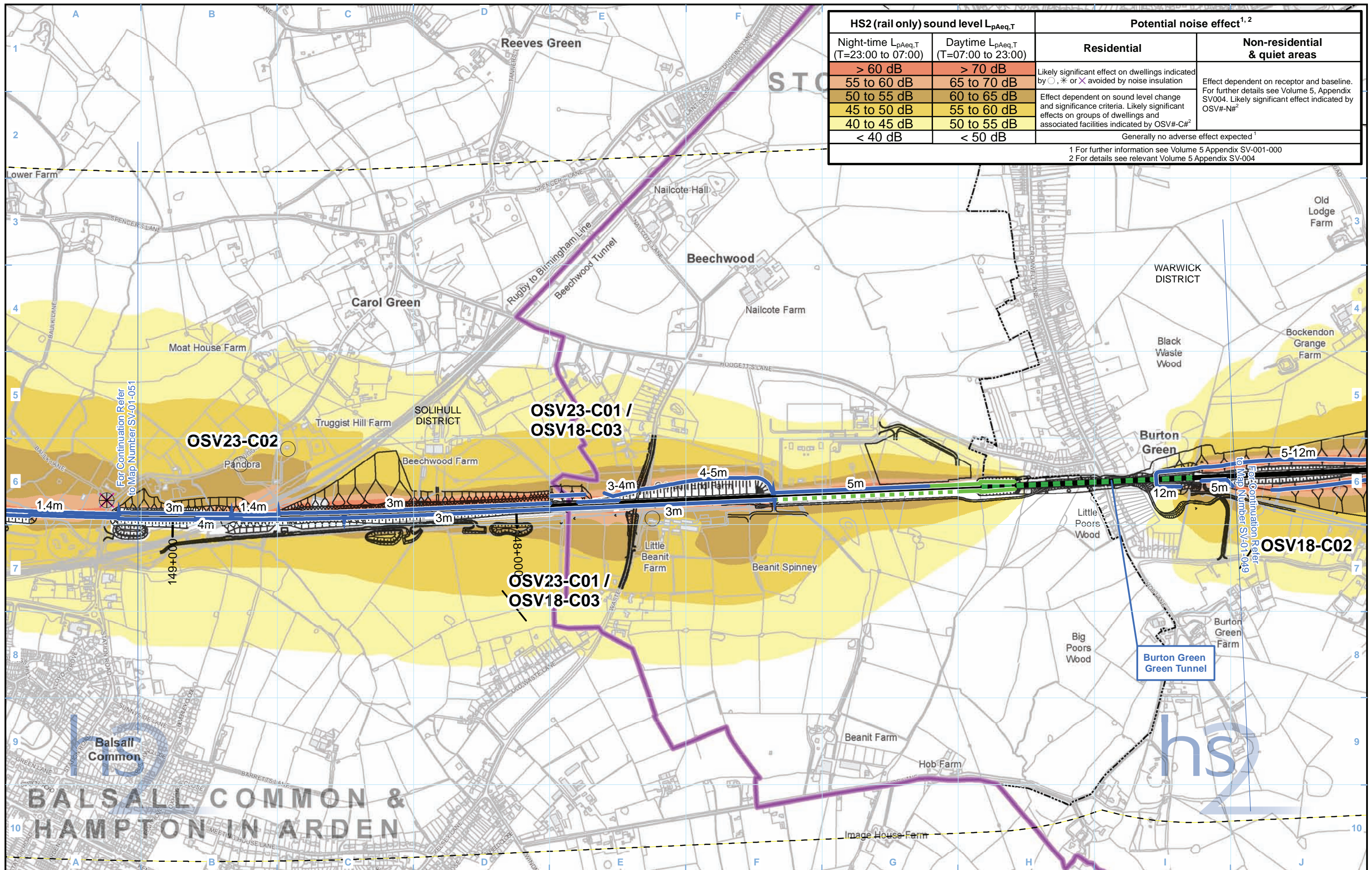
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HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1, 2}	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 60 dB	> 70 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
55 to 60 dB	65 to 70 dB		
50 to 55 dB	60 to 65 dB		
45 to 50 dB	55 to 60 dB		
40 to 45 dB	50 to 55 dB		
< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
1 For further information see Volume 5 Appendix SV-001-000			
2 For details see relevant Volume 5 Appendix SV-004			

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

Envisaged mitigation to avoid / reduce significant noise effects:

- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Airborne sound study area

- Potential additional noise insulation (triggered by maximum sound levels at night)¹
- Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
- Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

* Labelled with total barrier height above rail level

Map Number

SV-01-050b

Map Name

Operational Sound Contour Maps and Likely Significant Effects

Community Forum Area CFA23:
Balsall Common & Hampton in Arden

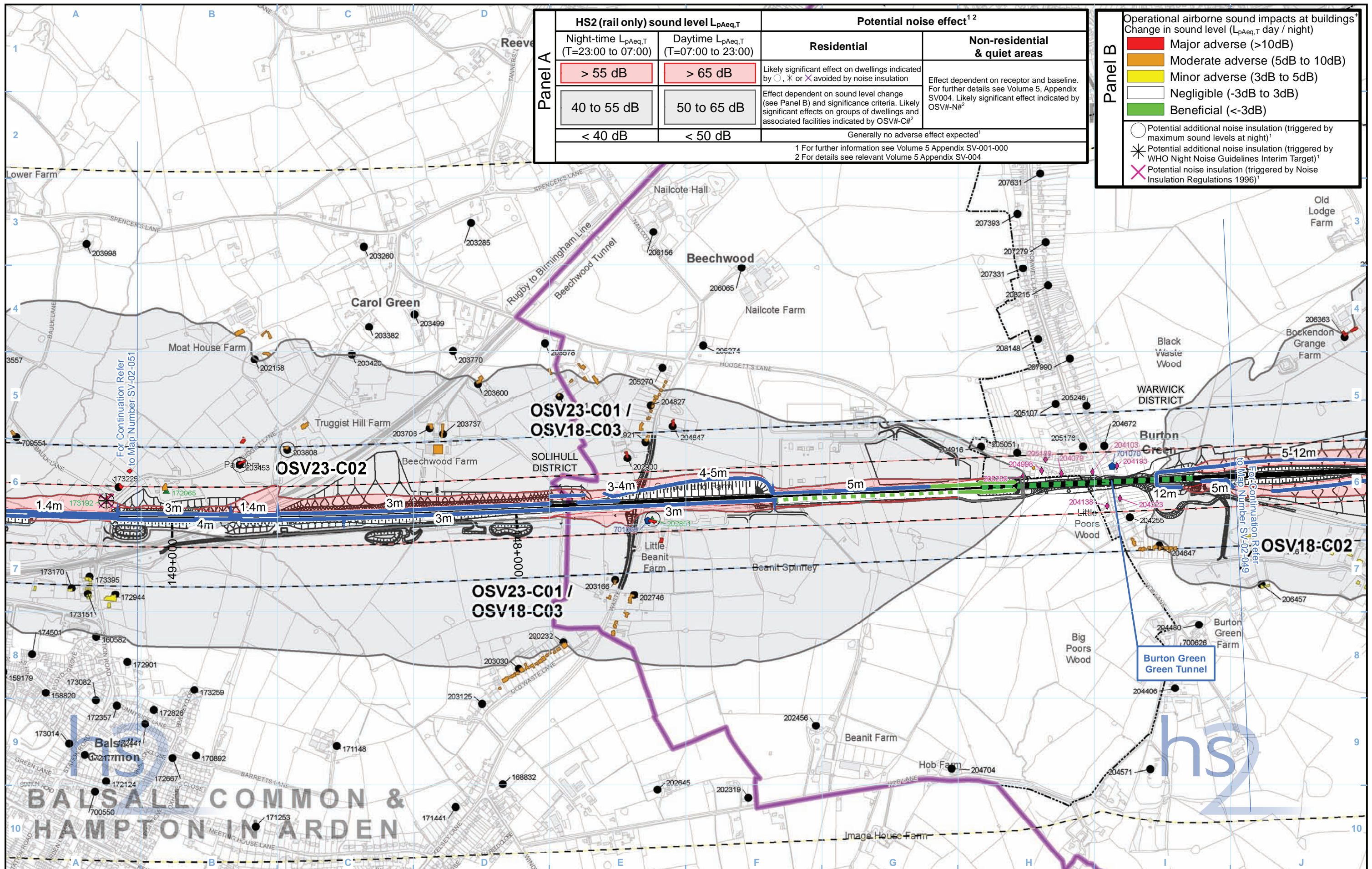
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Date: 29/10/13



Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1,2}	
	Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
	40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
	< 40 dB	< 50 dB	Generally no adverse effect expected ¹	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B	Operational airborne sound impacts at buildings* Change in sound level ($L_{pAeq,T}$ day / night)	
	Major adverse (>10dB)	
	Moderate adverse (5dB to 10dB)	
	Minor adverse (3dB to 5dB)	
	Negligible (-3dB to 3dB)	

○ Potential additional noise insulation (triggered by maximum sound levels at night)¹
✱ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level

Legend - Sound related features

- Committed developments (label as CFA#/#)
- Envisaged mitigation to avoid / reduce significant noise effects:
 - Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
 - Other environmental features e.g. landscaping
 - Engineering e.g. cuttings
- Envisaged measures further reducing noise effects:
 - Other environmental features e.g. landscaping
 - Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact*

Map Number: SV-02-050b

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA23: Balsall Common & Hampton in Arden

hs2

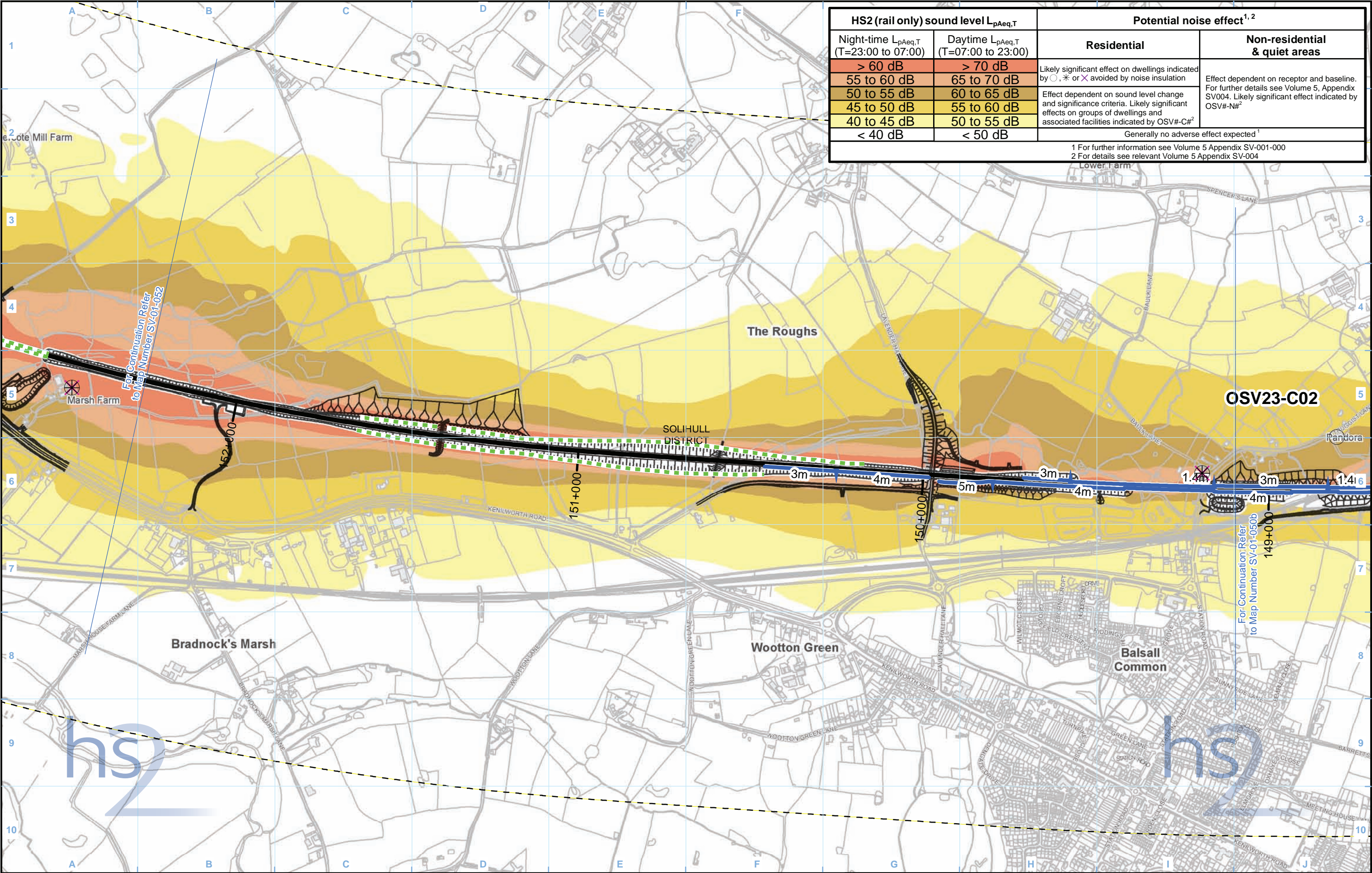
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Doc Number: C250-ARP-EV-MAP-000-003723

Date: 31/10/13



HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1, 2}	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 60 dB	> 70 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
55 to 60 dB	65 to 70 dB		
50 to 55 dB	60 to 65 dB		
45 to 50 dB	55 to 60 dB		
40 to 45 dB	50 to 55 dB		
< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
1 For further information see Volume 5 Appendix SV-001-000			
2 For details see relevant Volume 5 Appendix SV-004			

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Envisaged mitigation to avoid / reduce significant noise effects:
 - Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
 - Other environmental e.g. landscaping
 - Engineering e.g. cuttings

- Airborne sound study area
- Potential additional noise insulation (triggered by maximum sound levels at night)¹
- Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
- Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

* Labelled with total barrier height above rail level

Map Number

SV-01-051

Map Name

Operational Sound Contour Maps and Likely Significant Effects

Community Forum Area CFA23:
Balsall Common & Hampton in Arden

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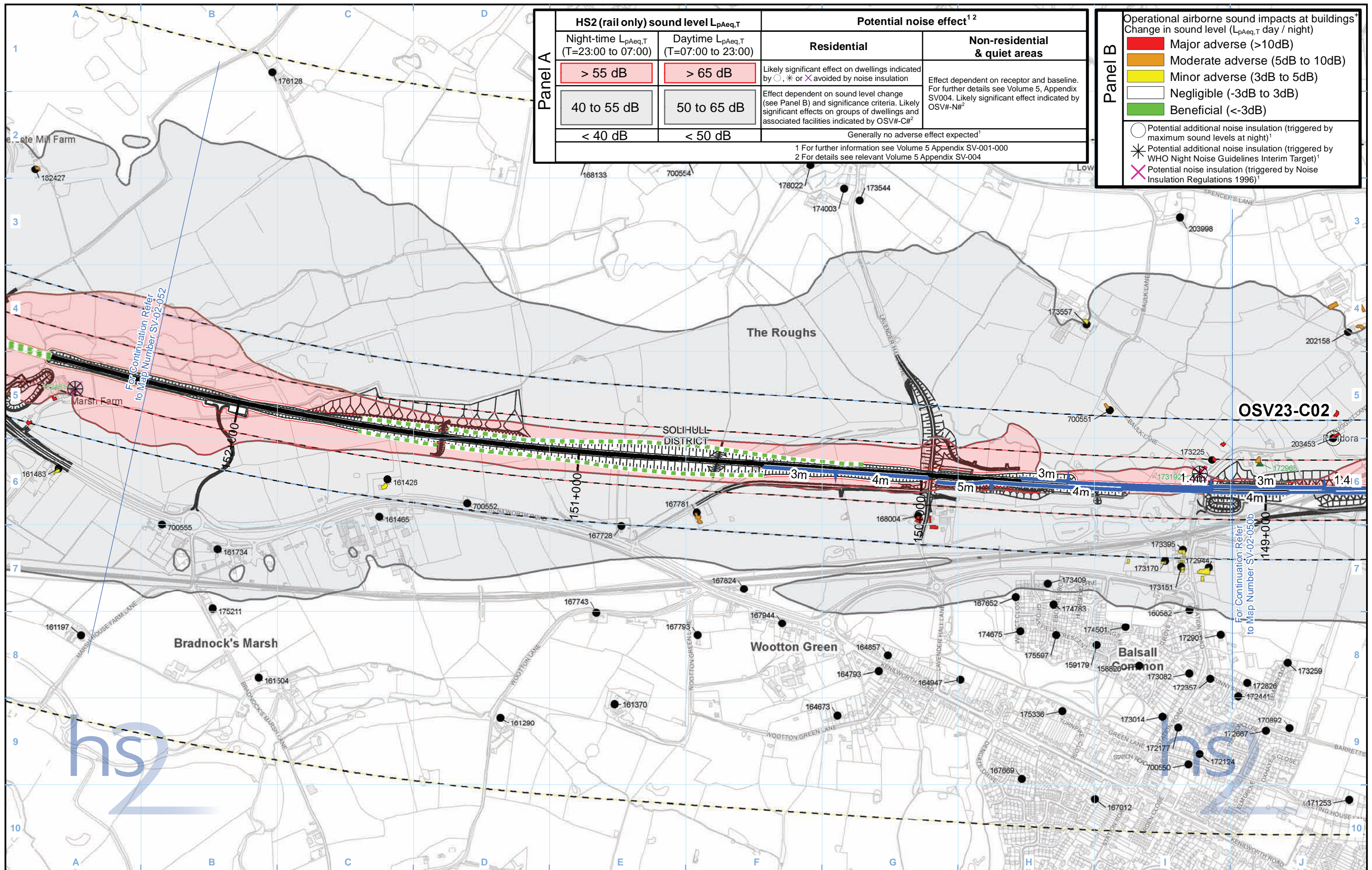
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Doc Number: C250-ARP-EV-MAP-000-003614

Scale at A3: 1:10,000

Metres

Date: 29/10/13



HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1 2}	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, * or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
< 40 dB	< 50 dB	Generally no adverse effect expected ¹	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings⁺
Change in sound level ($L_{pAeq,T}$ day / night)

Major adverse (>10dB)

Moderate adverse (5dB to 10dB)

Minor adverse (3dB to 5dB)

Negligible (-3dB to 3dB)

Beneficial (<-3dB)

○ Potential additional noise insulation (triggered by maximum sound levels at night)¹

* Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹

✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

Legend - General features

Route in bored tunnel

Route in green tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

District/Borough boundary

County boundary

Engineering earthworks: Non engineering earthworks:

Embankment

Cutting

Embankment

Cutting

* Residential buildings only
* Labelled with total barrier height above rail level

Legend - Sound related features

Committed developments (label as CFA#/#)

Envisaged mitigation to avoid / reduce significant noise effects:

Landscaping and/or fence barriers*

Envisaged measures further reducing noise effects:

Other environmental features e.g. landscaping

Engineering e.g. cuttings (green tunnels separately marked)

Engineering e.g. cuttings

Airborne sound study area

Ground-borne sound & vibration study area (residential and non-residential)

Ground-borne sound & vibration study area (highly sensitive non-residential)

Airborne sound assessment location

Airborne sound and vibration assessment location

Ground-borne sound and/or vibration assessment location

Airborne sound, ground-borne sound and vibration assessment location

Minor ground-borne noise or vibration impact*

Map Number

SV-02-051

Map Name

Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA23:
Balsall Common & Hampton in Arden

hs2

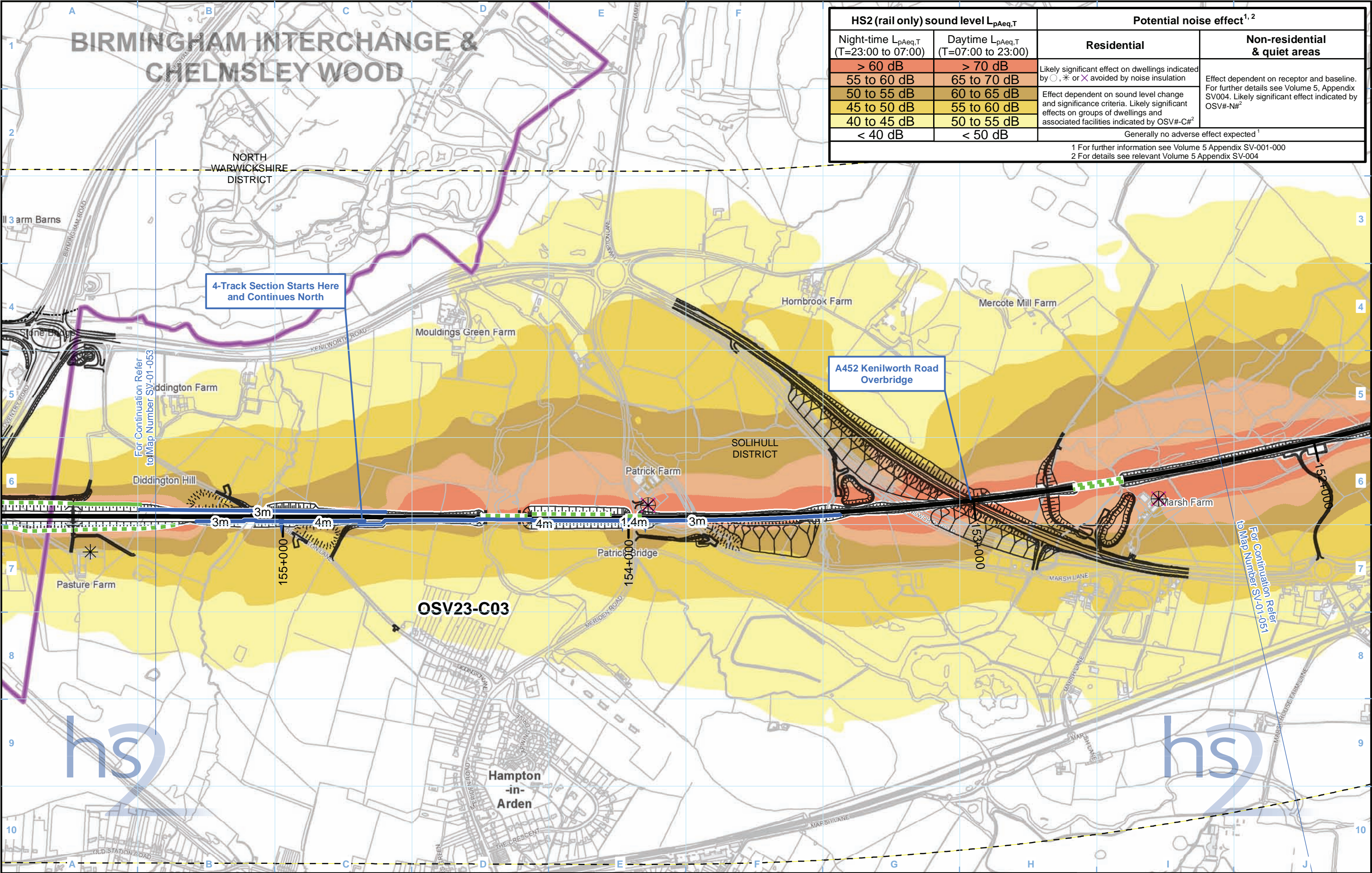
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Doc Number: C250-ARP-EV-MAP-000-003724

Date: 31/10/13



HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1, 2}	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 60 dB	> 70 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
55 to 60 dB	65 to 70 dB		
50 to 55 dB	60 to 65 dB		
45 to 50 dB	55 to 60 dB		
40 to 45 dB	50 to 55 dB		
< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-004			

- Legend - General features
- Route in bored tunnel
 - Route in green tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community forum boundary
 - District/Borough boundary
 - County boundary

- Engineering earthworks:
- Embankment
 - Cutting
- Non engineering earthworks:
- Embankment
 - Cutting

- Legend - Sound related features
- Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
 - Engineering e.g. cuttings

- Airborne sound study area
 - Potential additional noise insulation (triggered by maximum sound levels at night)¹
 - Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
 - Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹
- * Labelled with total barrier height above rail level

Map Number: SV-01-052

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Forum Area CFA23: Balsall Common & Hampton in Arden

hs2

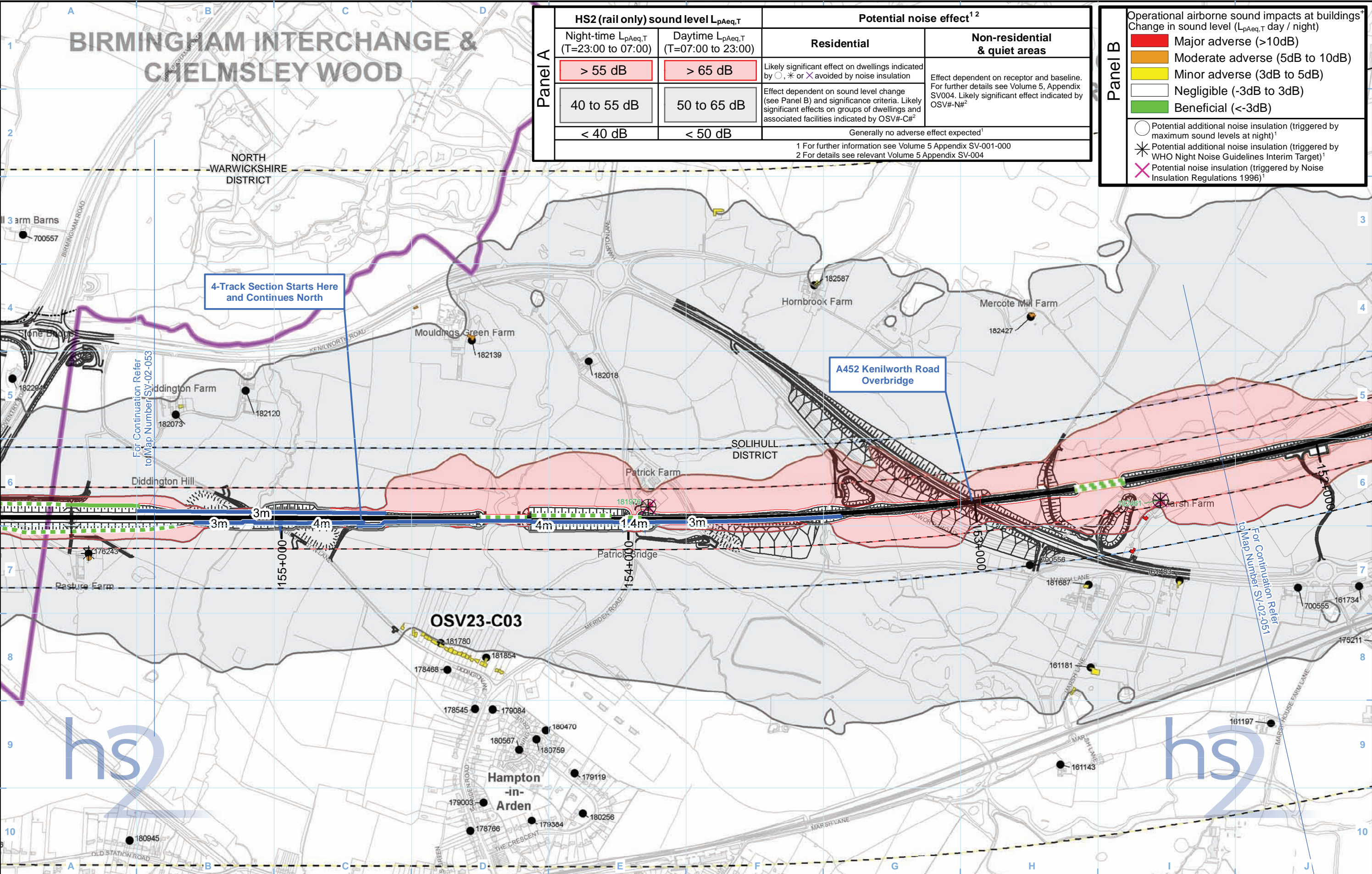
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Doc Number: C250-ARP-EV-MAP-000-003615

Date: 29/10/13



Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1 2}	
	Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, * or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
	40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
	< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
	1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-004			

Panel B	Operational airborne sound impacts at buildings* Change in sound level ($L_{pAeq,T}$ day / night)	
	Major adverse (>10dB)	
	Moderate adverse (5dB to 10dB)	
	Minor adverse (3dB to 5dB)	
	Negligible (-3dB to 3dB)	
		Beneficial (<-3dB)
		○ Potential additional noise insulation (triggered by maximum sound levels at night) ¹
		* Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target) ¹
		✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996) ¹

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Committed developments (label as CFA#/#)
- Envisaged mitigation to avoid / reduce significant noise effects:
 - Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
 - Envisaged measures further reducing noise effects:
 - Other environmental features e.g. landscaping
 - Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact*

Map Number
SV-02-052

Map Name
Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA23:
Balsall Common & Hampton in Arden

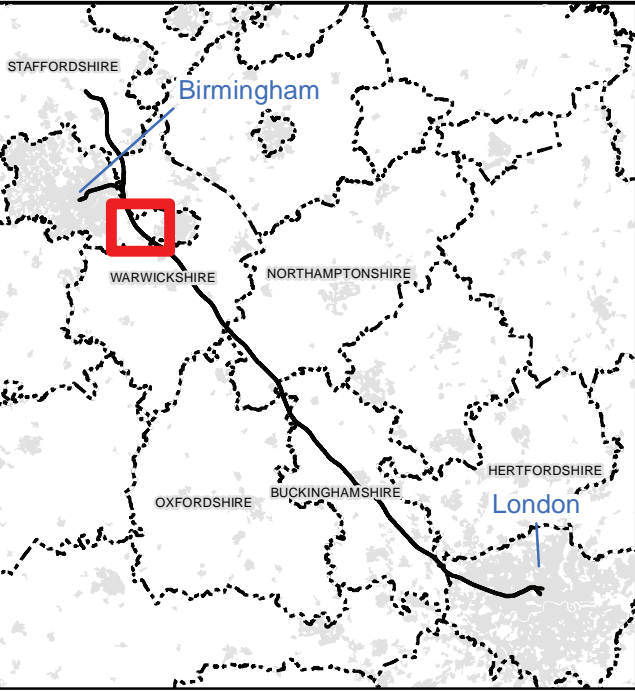
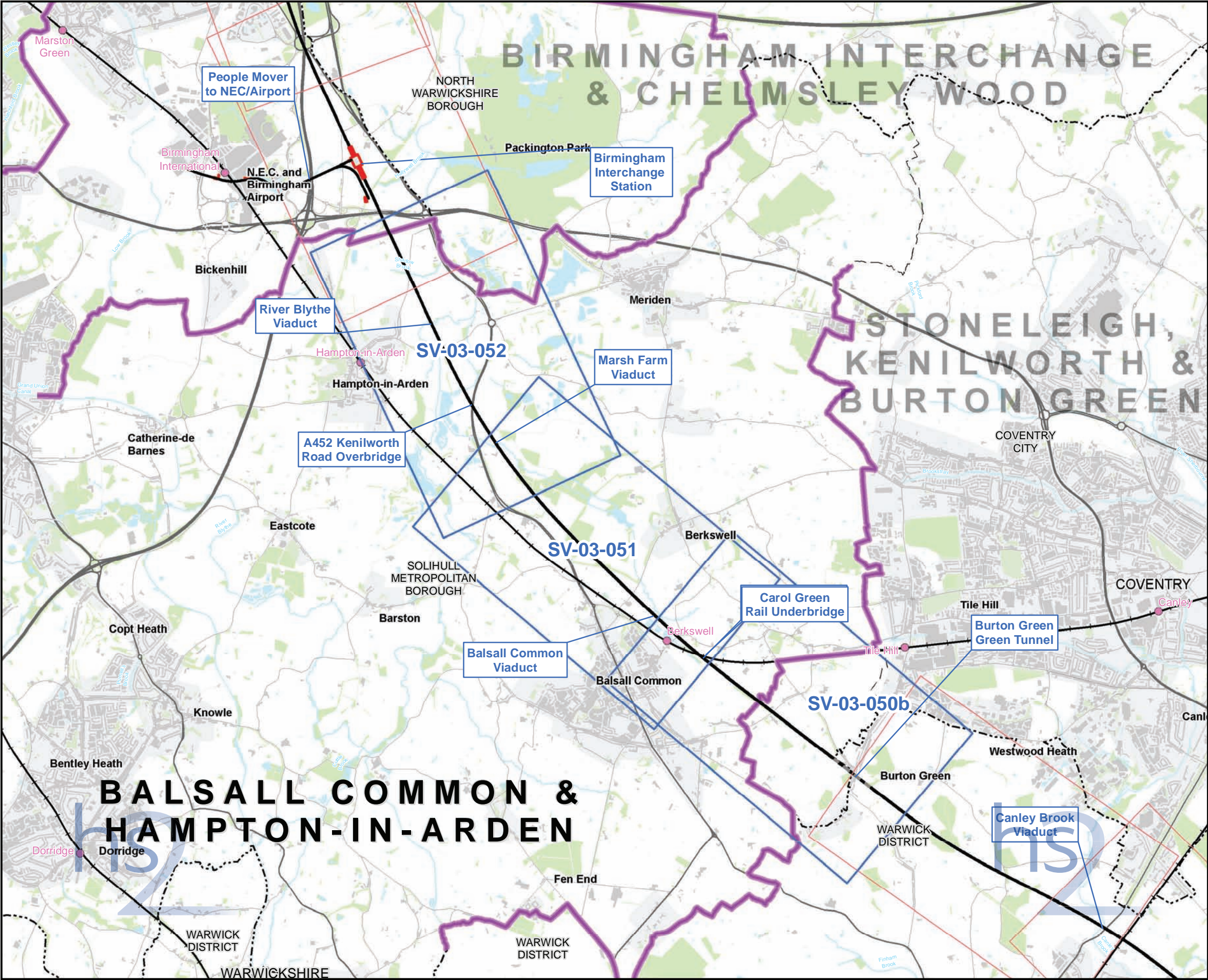
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Map Series Information:

The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-003 and Volume 5: Appendix SV-002.

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

Route in tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

Existing railway station

County boundary

District/Borough boundary

Map sheets included in this community forum

Map sheets not included in this community forum

Map Number

SV-03-INDEX-CFA23

Map Name

Index Map of:
Assessment and Monitoring Locations for
Construction Sound, Noise & Vibration Assessments

Community Forum Area CFA23:

Balsall Common & Hampton in Arden

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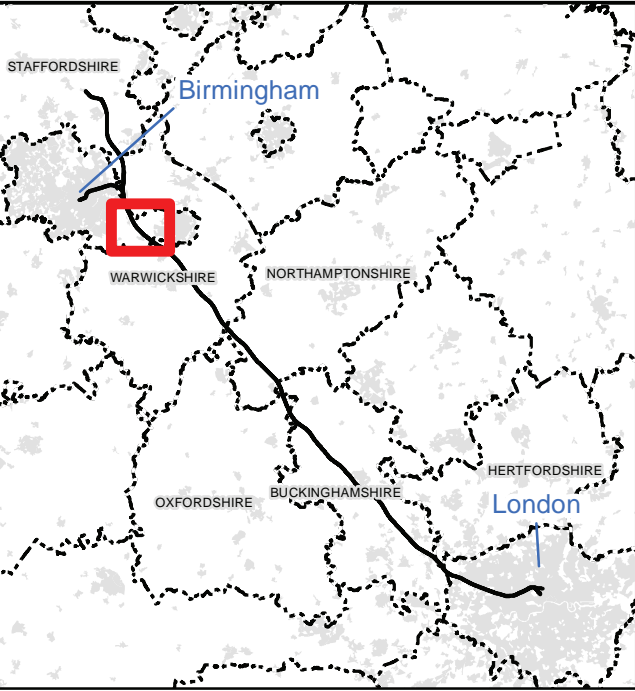
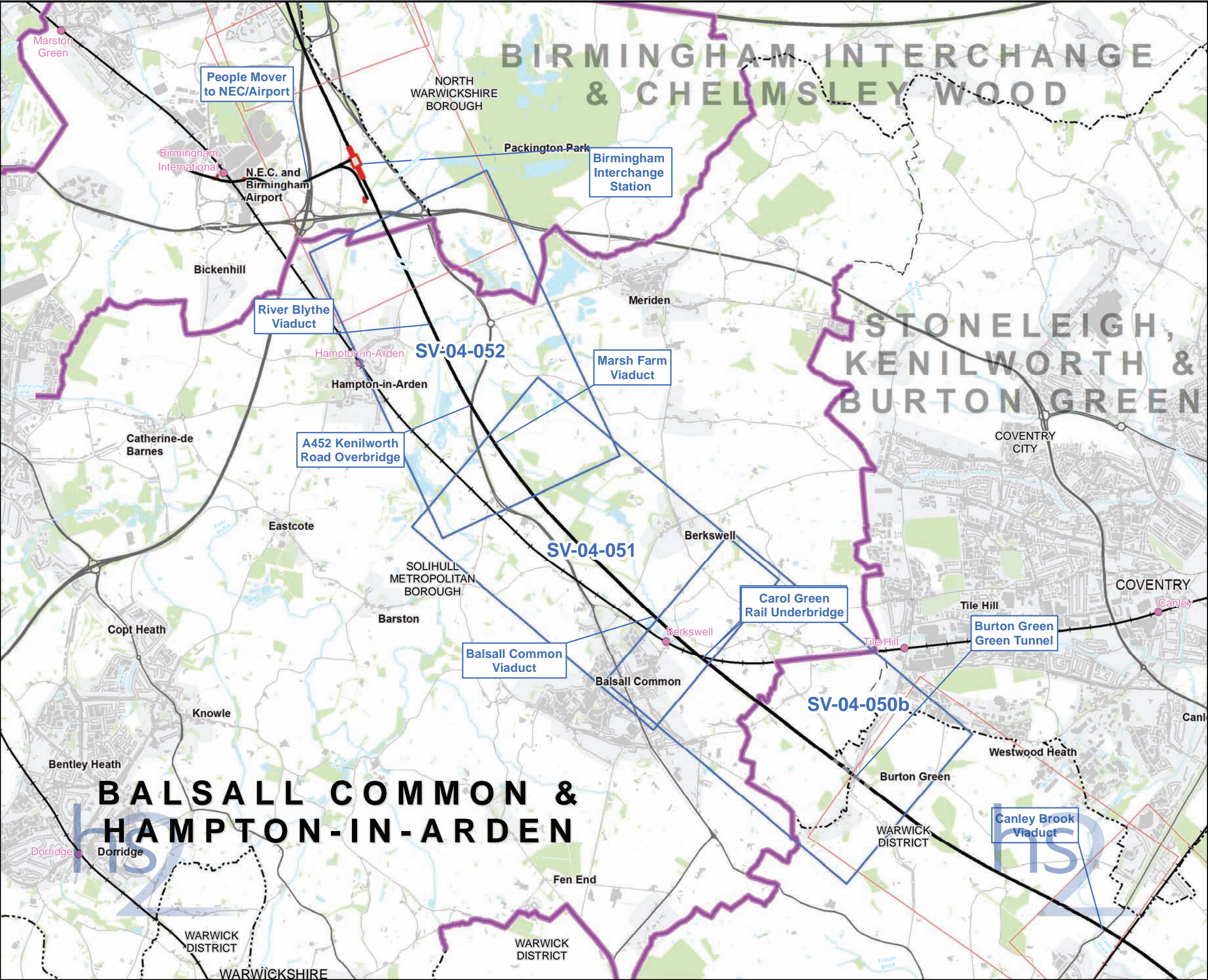
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Doc Number: C250-ARP-EV-MAP-000-004131-P06.00

Date: 29/10/13



Map Series Information:

The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004 and Volume 5: Appendix SV-002.

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.


A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.


Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community forum
- Map sheets not included in this community forum


Map Number	SV-04-INDEX-CFA23
Map Name	Index Map of: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments
Community Forum Area CFA23: Balsall Common & Hampton in Arden	



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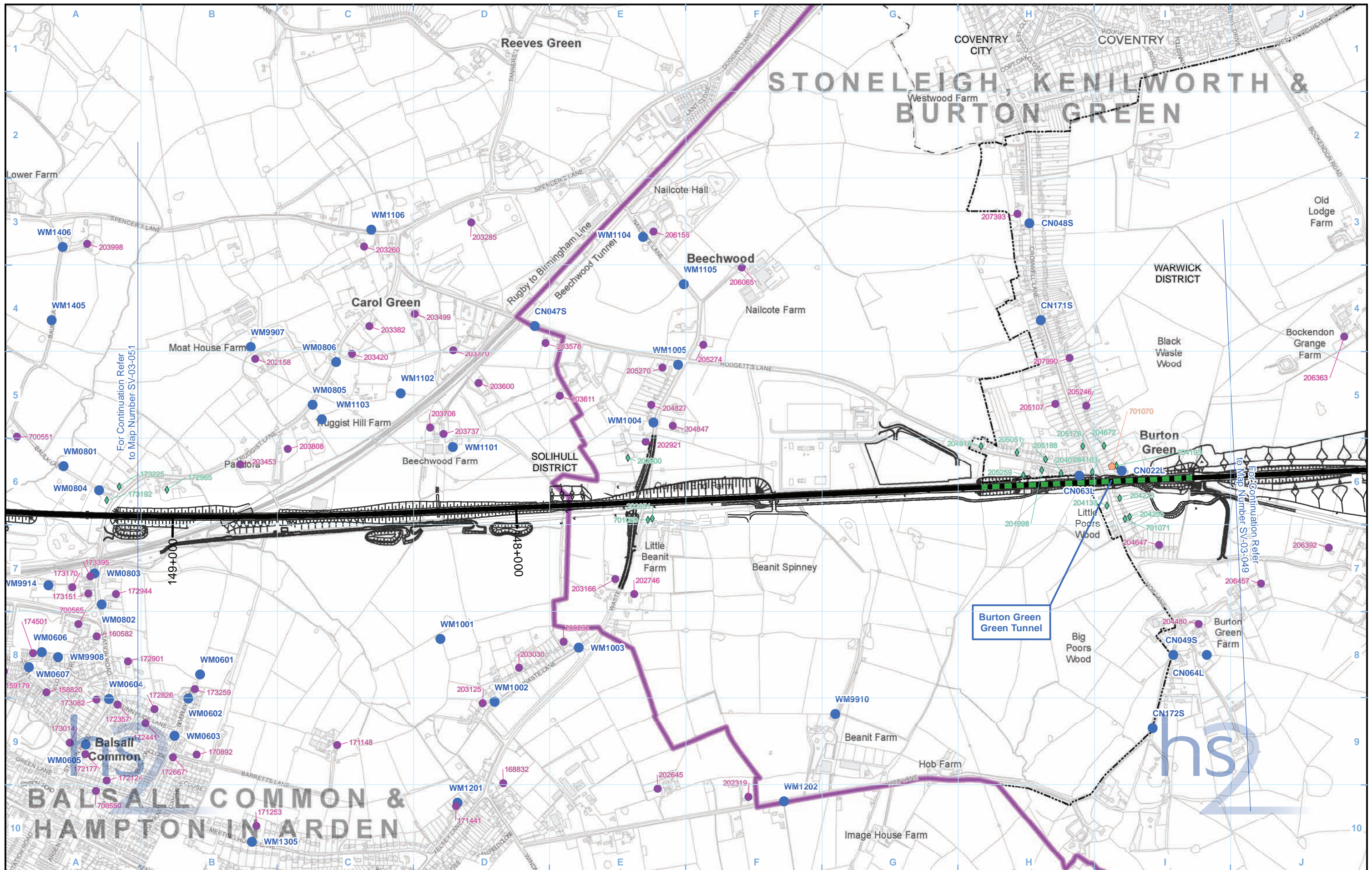
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Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

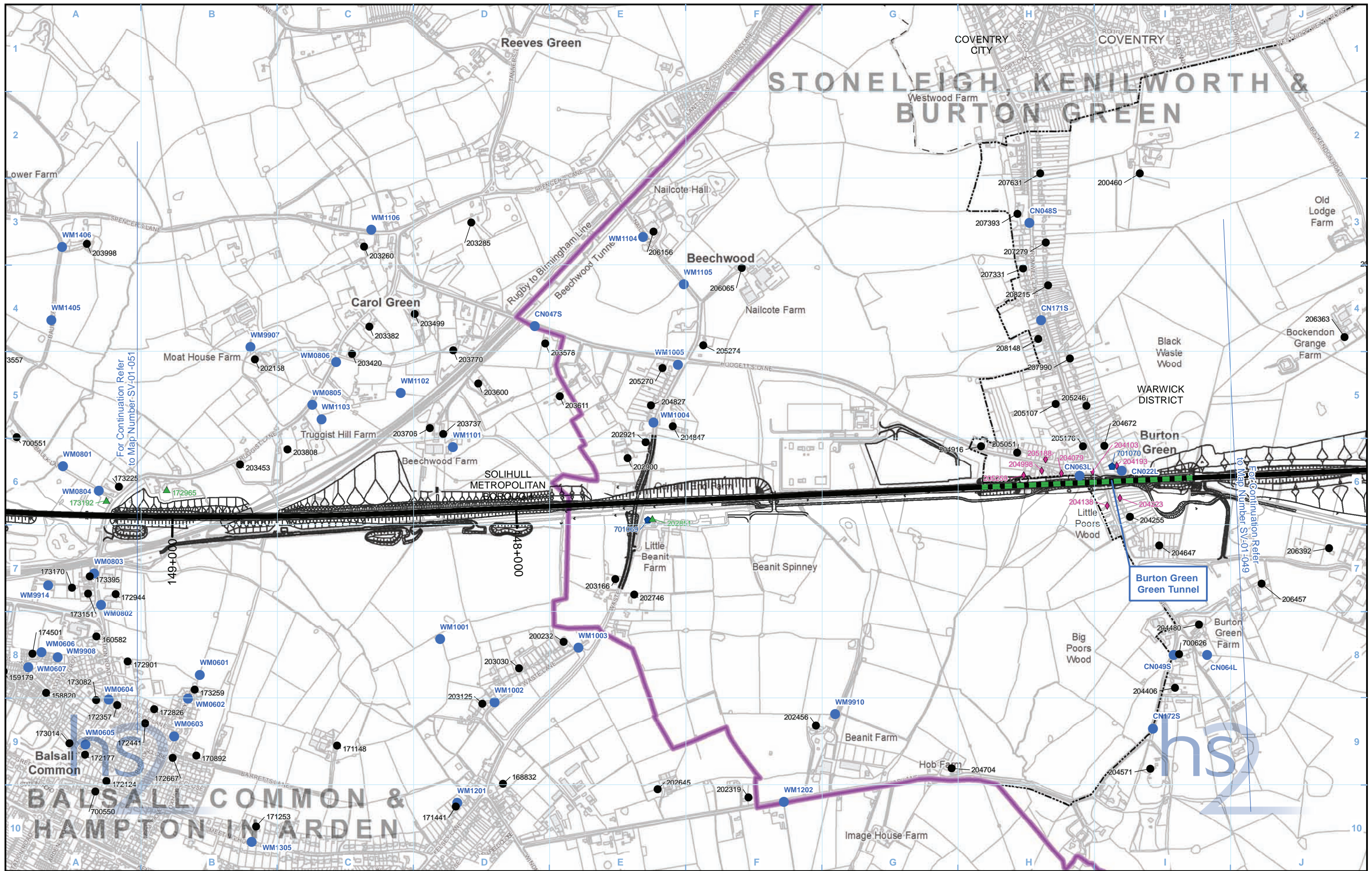
- Construction airborne sound assessment location
- Construction vibration assessment locations
- Construction airborne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see relevant Vol 5 Appendix SV-003)

(labelled with Measurement Location reference code)

Map Number	SV-03-050b
Map Name	Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments
Community Forum Area CFA23: Balsall Common & Hampton in Arden	

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Doc Number: C250-ARP-EV-MAP-000-003824	Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

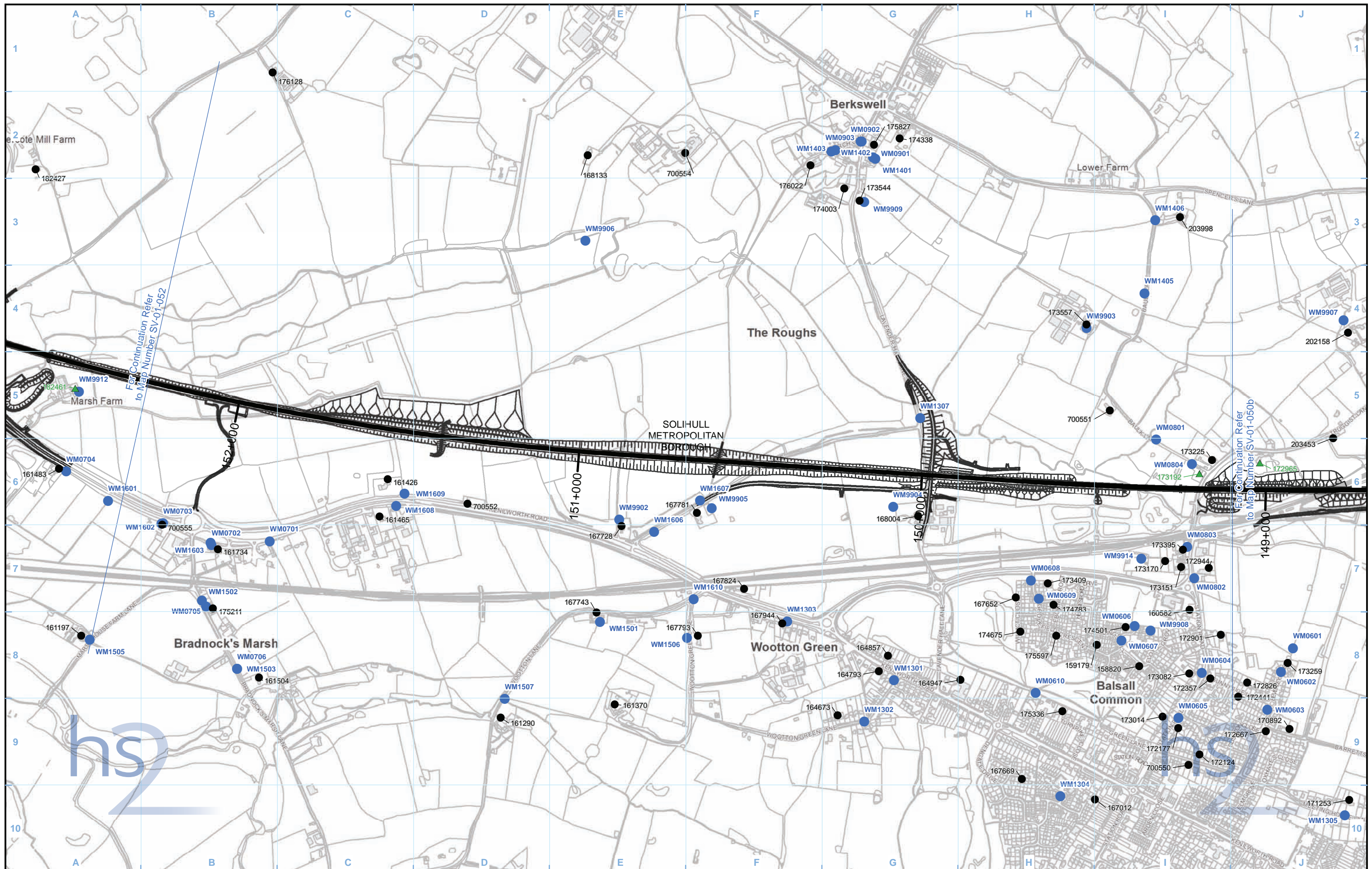
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV004)

labelled with Measurement Location reference code

Map Number	SV-04-050b
Map Name	Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments
Community Forum Area CFA23: Balsall Common & Hampton in Arden	

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Doc Number: C250-ARP-EV-MAP-000-003925	Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting


Legend - Sound related features

- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV004)

labelled with Measurement Location reference code

Map Number	SV-04-051
Map Name	Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments
Community Forum Area CFA23: Balsall Common & Hampton in Arden	




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Doc Number: C250-ARP-EV-MAP-000-003926

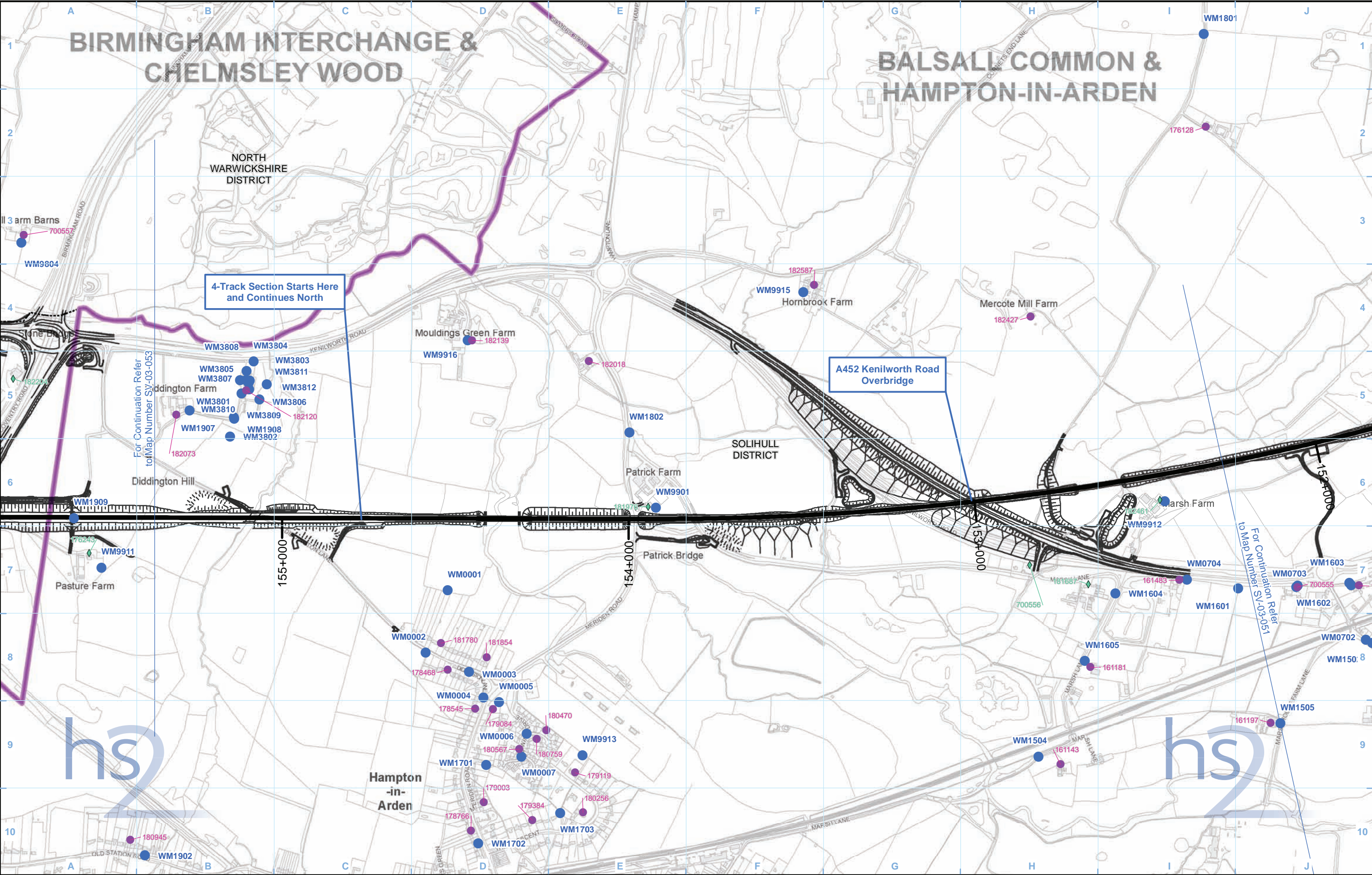


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0 100 200 300 400 Metres

Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
- Construction vibration assessment locations
- Construction airborne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see relevant Vol 5 Appendix SV-003)

(labelled with Measurement Location reference code)

Map Number	SV-03-052
Map Name	Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments
Community Forum Area CFA23: Balsall Common & Hampton in Arden	

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Doc Number: C250-ARP-EV-MAP-000-003826

Date: 29/10/13

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LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

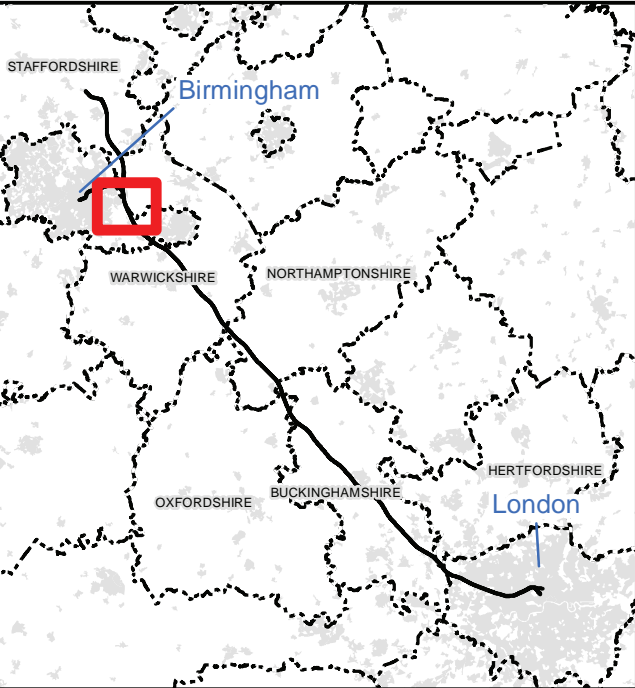
CFA24 | Birmingham Interchange and Chelmsley Wood

SV-01 - Operational Sound Contour Maps and Likely Significant Effects

SV-02 - Operational Airborne Noise and Vibration Impacts and Likely Significant Effects
(with Assessment Locations)

SV-03 - Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

SV-04 - Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

Route in tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

Existing railway station

County boundary

District/Borough boundary

Map sheets included in this community forum

Map sheets not included in this community forum

Map NumberSV-01-INDEX-CFA24

Map NameIndex Map of:
Operational Sound Contour Maps and
Likely Significant Effects

Community Forum Area CFA24:
Birmingham Interchange & Chelmsley Wood

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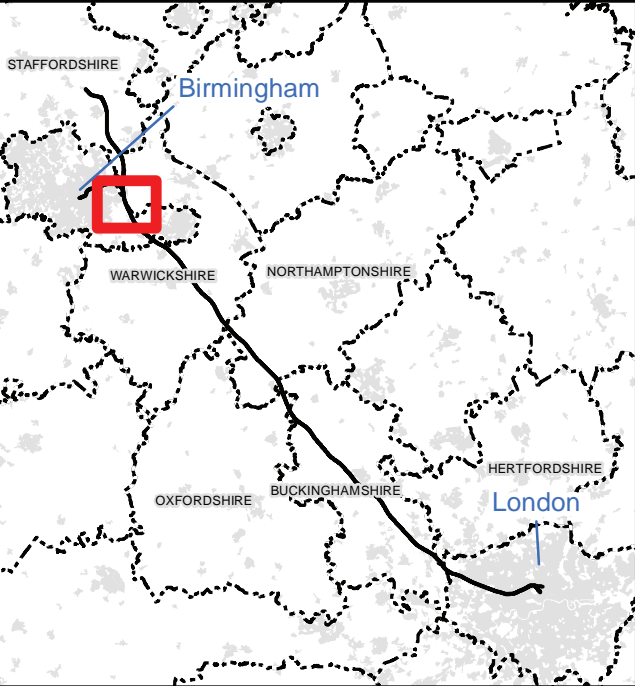
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05001,0001,5002,000

Metres

Doc Number: C250-ARP-EV-MAP-000-004081--P04.00

Date: 29/10/13



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

Key items on the map include the following:

- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
- the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
- sound contours representing sound produced by the new railway (displayed in a simpler manner than on SV-01 in order not to obscure other features on the map series);
- the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
- labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

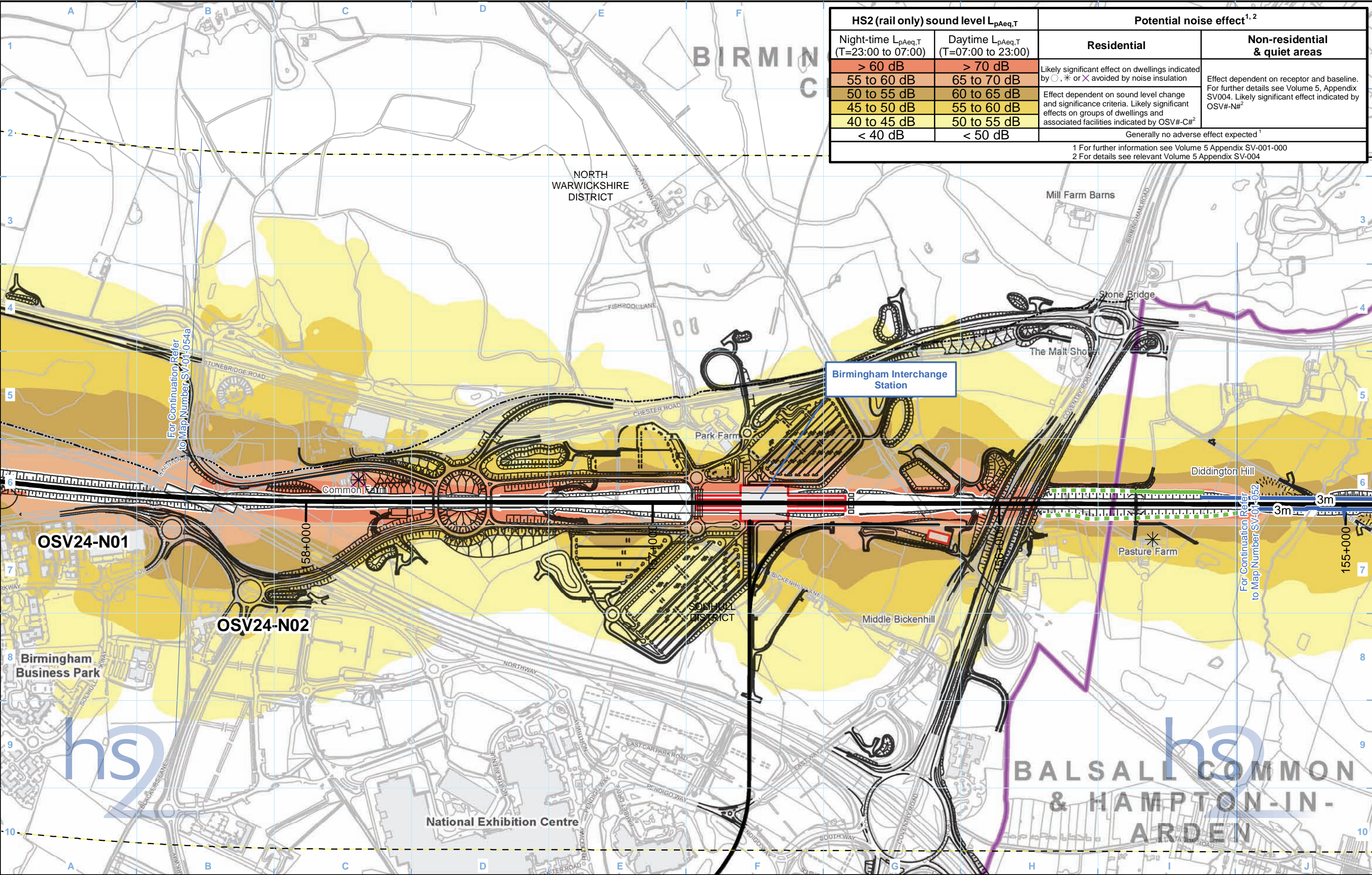
A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

Map Number	SV-02-INDEX-CFA24
Map Name	Index Map of: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)
	Community Forum Area CFA24: Birmingham Interchange & Chelmsley Wood

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Doc Number: C250-ARP-EV-MAP-000-004106--P04.00		Date: 29/10/13



HS2 (rail only) sound level L _{pAeq,T}		Potential noise effect ^{1, 2}	
Night-time L _{pAeq,T} (T=23:00 to 07:00)	Daytime L _{pAeq,T} (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 60 dB	> 70 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
55 to 60 dB	65 to 70 dB		
50 to 55 dB	60 to 65 dB		
45 to 50 dB	55 to 60 dB		
40 to 45 dB	50 to 55 dB		
< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
1 For further information see Volume 5 Appendix SV-001-000			
2 For details see relevant Volume 5 Appendix SV-004			

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Envisaged mitigation to avoid / reduce significant noise effects:
 - Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
 - Other environmental e.g. landscaping
 - Engineering e.g. cuttings

- Airborne sound study area
- Potential additional noise insulation (triggered by maximum sound levels at night)¹
- Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
- Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

* Labelled with total barrier height above rail level

Map Number

SV-01-053

Map Name

Operational Sound Contour Maps and Likely Significant Effects

Community Forum Area CFA24:
Birmingham Interchange & Chelmsley Wood

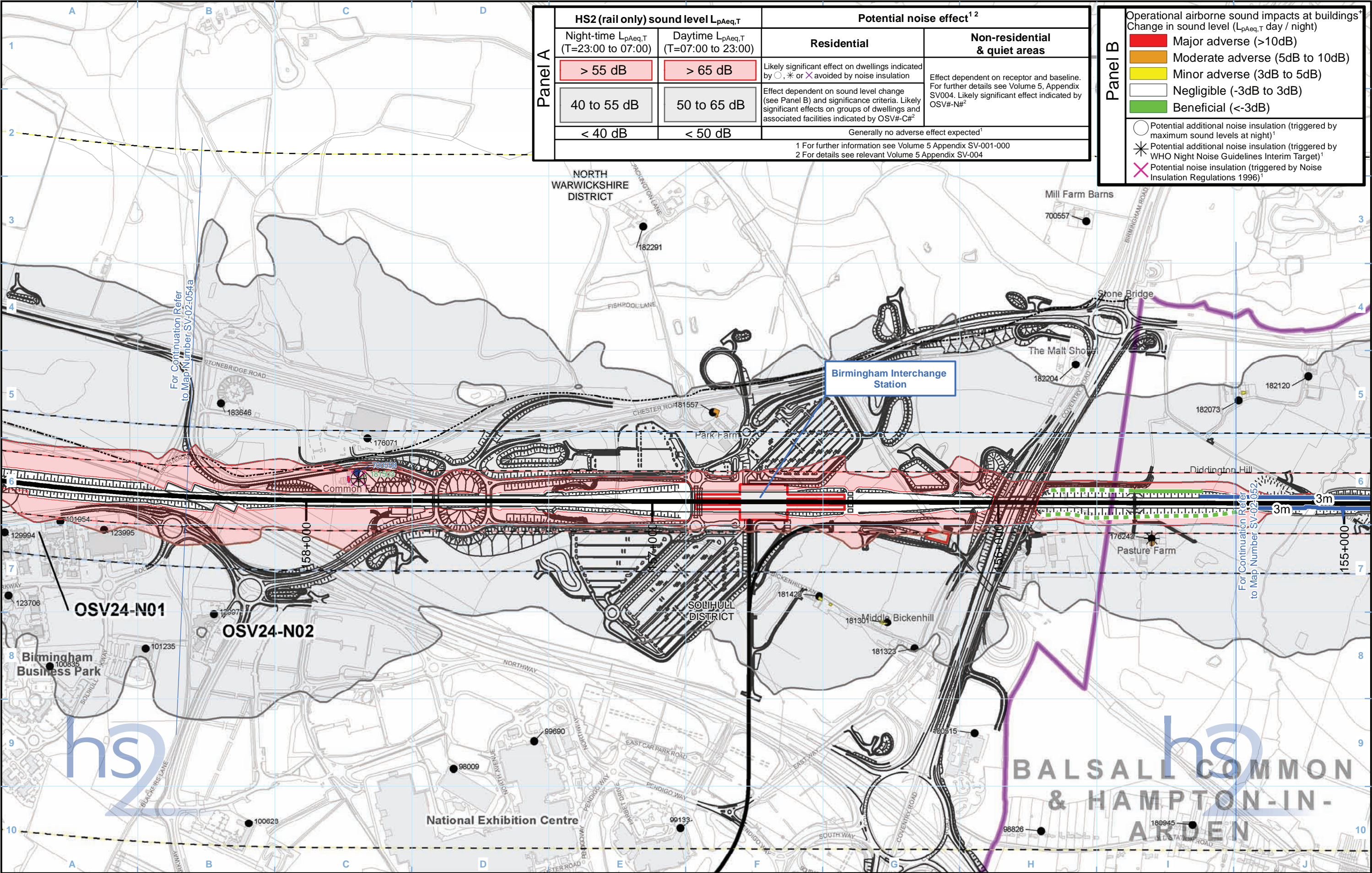
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Doc Number: C250-ARP-EV-MAP-000-003616

Scale at A3: 1:10,000

Date: 29/10/13



Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1 2}	
	Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
	40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
	< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
	1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-004			

Panel B	Operational airborne sound impacts at buildings ⁺ Change in sound level ($L_{pAeq,T}$ day / night)	
	Major adverse (>10dB)	
	Moderate adverse (5dB to 10dB)	
	Minor adverse (3dB to 5dB)	
	Negligible (-3dB to 3dB)	
		Beneficial (<-3dB)
		○ Potential additional noise insulation (triggered by maximum sound levels at night) ¹
		✱ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target) ¹
		✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996) ¹

Legend - General features

- Route in bored tunnel
 - Route in green tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community forum boundary
 - District/Borough boundary
 - County boundary
- Engineering earthworks:
- Embankment
 - Cutting
- Non engineering earthworks:
- Embankment
 - Cutting
- * Residential buildings only
* Labelled with total barrier height above rail level

Legend - Sound related features

- Committed developments (label as CFA#/#)
 - Envisaged mitigation to avoid / reduce significant noise effects:
 - Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
 - Other environmental features e.g. landscaping
 - Engineering e.g. cuttings
 - Envisaged measures further reducing noise effects:
 - Other environmental features e.g. landscaping
 - Engineering e.g. cuttings
 - Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
 - Ground-borne sound & vibration study area (highly sensitive non-residential)
 - Airborne sound assessment location
 - Airborne sound and vibration assessment location
 - Ground-borne sound and/or vibration assessment location
 - Airborne sound, ground-borne sound and vibration assessment location
 - Minor ground-borne noise or vibration impact*

Map Number: SV-02-053

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA24: Birmingham Interchange & Chelmsley Wood

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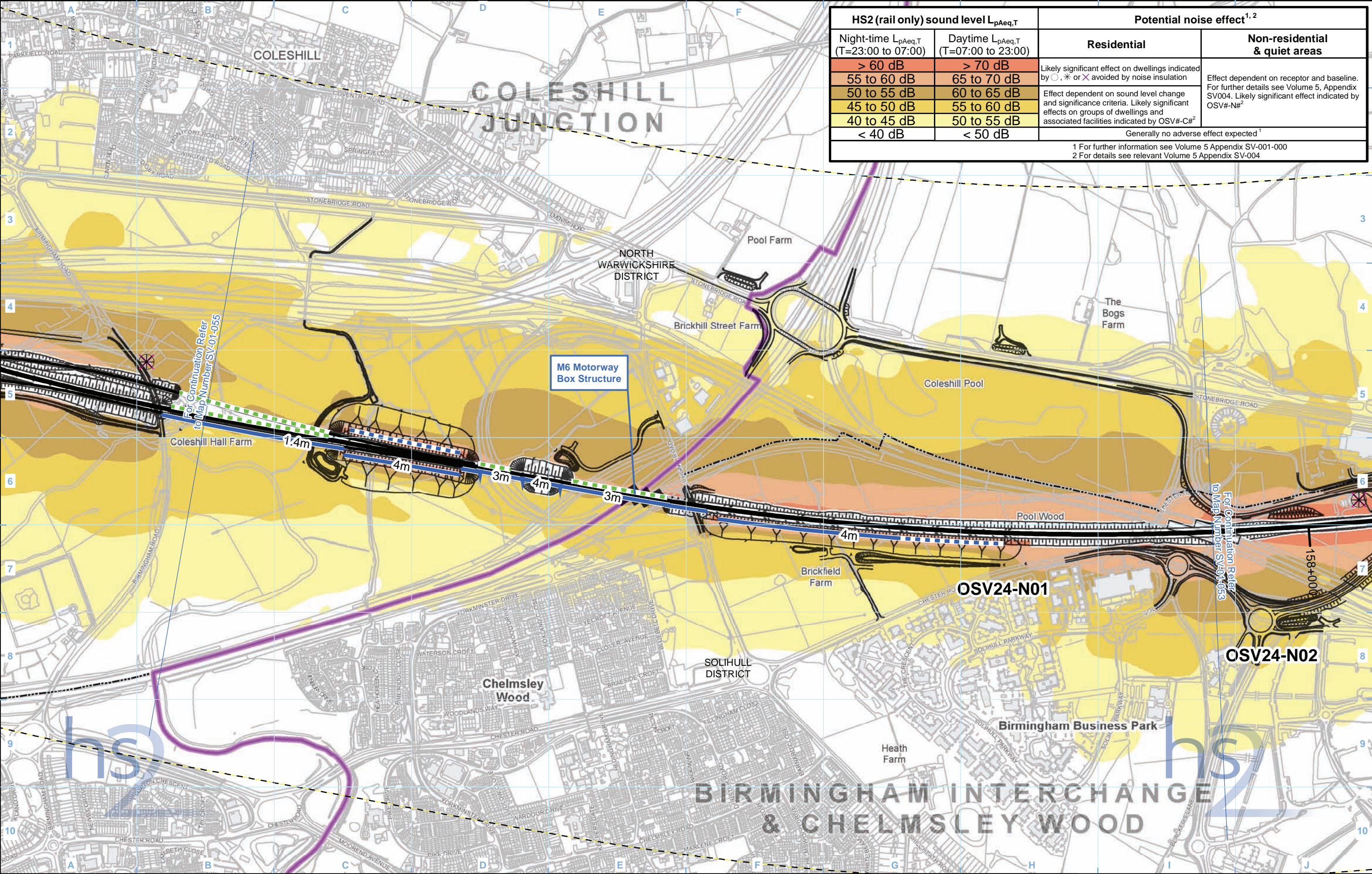
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Doc Number: C250-ARP-EV-MAP-000-003726

Date: 31/10/13



HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1, 2}	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 60 dB	> 70 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
55 to 60 dB	65 to 70 dB		
50 to 55 dB	60 to 65 dB		
45 to 50 dB	55 to 60 dB		
40 to 45 dB	50 to 55 dB		
< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-004			

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Airborne sound study area

- Potential additional noise insulation (triggered by maximum sound levels at night)¹
- Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
- Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

* Labelled with total barrier height above rail level

Map Number

SV-01-054a

Map Name

Operational Sound Contour Maps and Likely Significant Effects

Community Forum Area CFA24:

Birmingham Interchange & Chelmsley Wood

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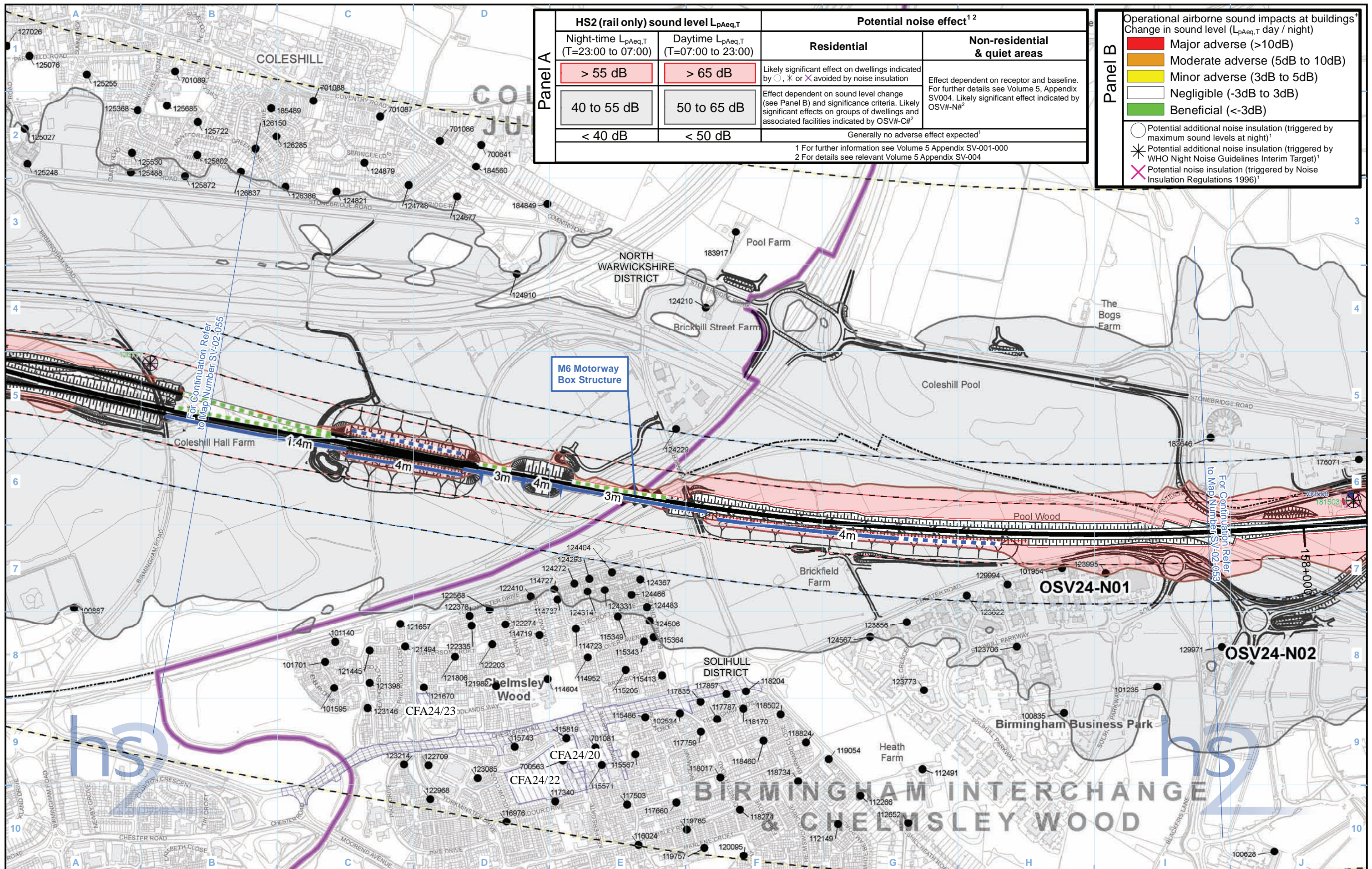
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Metres

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Doc Number: C250-ARP-EV-MAP-000-003617

Date: 29/10/13



Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1 2}	
	Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
	40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
	< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
	1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-004			

Panel B

Operational airborne sound impacts at buildings⁺
Change in sound level ($L_{pAeq,T}$ day / night)

Major adverse (>10dB)

Moderate adverse (5dB to 10dB)

Minor adverse (3dB to 5dB)

Negligible (-3dB to 3dB)

Beneficial (<-3dB)

○ Potential additional noise insulation (triggered by maximum sound levels at night)¹

✱ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹

✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

Legend - General features

Route in bored tunnel

Route in green tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

District/Borough boundary

County boundary

Engineering earthworks:

Embankment

Cutting

Non engineering earthworks:

Embankment

Cutting

* Residential buildings only

* Labelled with total barrier height above rail level

Legend - Sound related features

Committed developments (label as CFA#/#)

Envisaged mitigation to avoid / reduce significant noise effects:

Landscaping and/or fence barriers*

Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:

Other environmental features e.g. landscaping

Engineering e.g. cuttings

Airborne sound study area

Ground-borne sound & vibration study area (residential and non-residential)

Ground-borne sound & vibration study area (highly sensitive non-residential)

Airborne sound assessment location

Airborne sound and vibration assessment location

Ground-borne sound and/or vibration assessment location

Airborne sound, ground-borne sound and vibration assessment location

Minor ground-borne noise or vibration impact*

Map Number

SV-02-054a

Map Name

Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA24:
Birmingham Interchange & Chelmsley Wood

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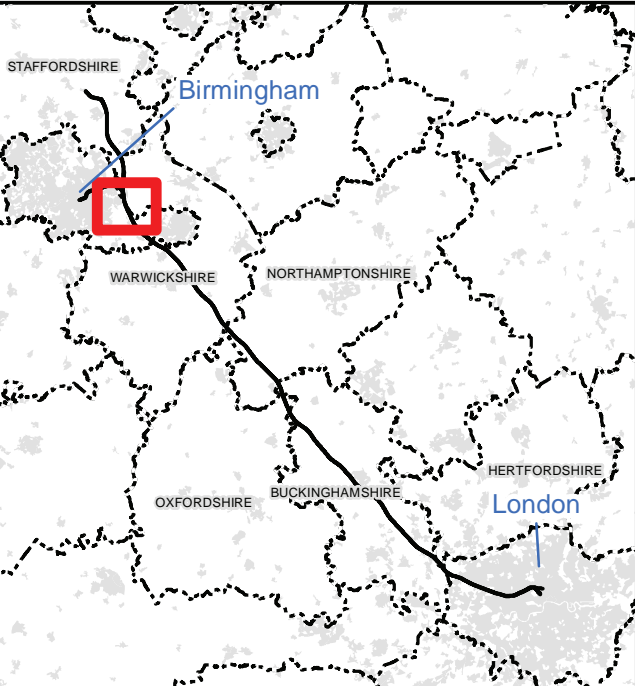
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Doc Number: C250-ARP-EV-MAP-000-003727

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Metres

Date: 31/10/13



Map Series Information:

The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-003 and Volume 5: Appendix SV-002.

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

Route in tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

Existing railway station

County boundary

District/Borough boundary

Map sheets included in this community forum

Map sheets not included in this community forum

Map NumberSV-03-INDEX-CFA24

Map NameIndex Map of:
Assessment and Monitoring Locations for
Construction Sound, Noise & Vibration Assessments

Community Forum Area CFA24:
Birmingham Interchange & Chelmsley Wood

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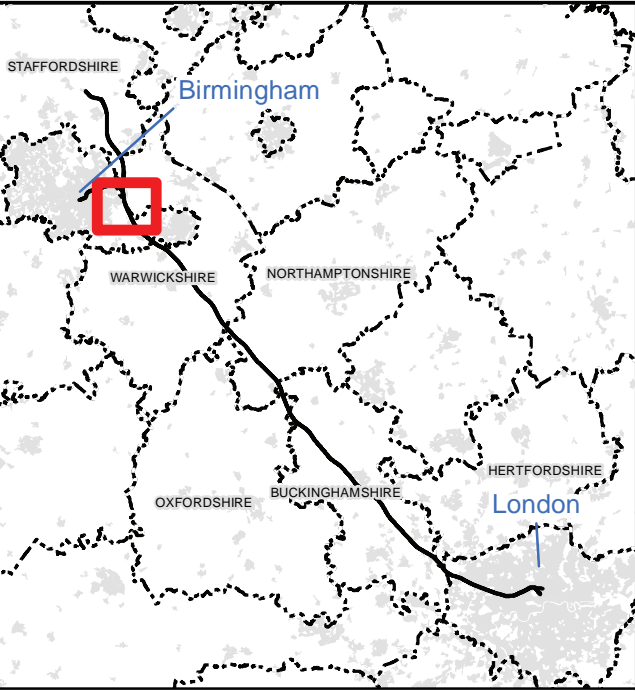
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Doc Number: C250-ARP-EV-MAP-000-004132-P06.00

Date: 29/10/13



Map Series Information:

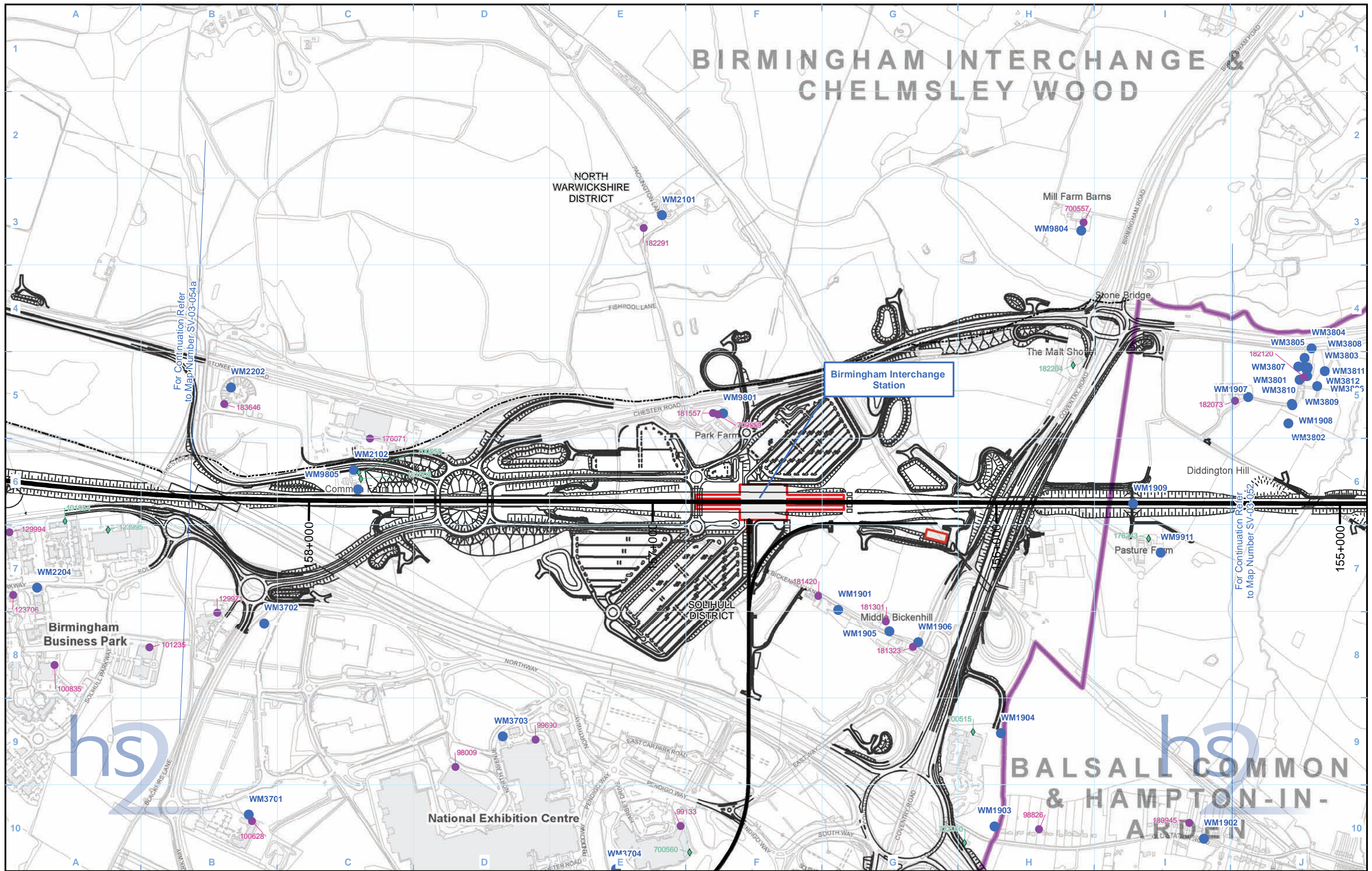
The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004 and Volume 5: Appendix SV-002.

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend Route in tunnel Route on surface Depot, station, headhouse or portal building Community forum boundary Existing railway station County boundary District/Borough boundary		<div>Map sheets included in this community forum</div> <div>Map sheets not included in this community forum</div>
Map Number SV-04-INDEX-CFA24		<div> HS2 Ltd accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.</div> <div>Registered in England. Registration number 06791686. Registered office: Eland House, Bressenden Place, London SW1E 5DU.</div> <div>© Crown copyright and database rights 2013 Ordnance Survey Licence Number 100049190.</div> <div>Scale at A3: 1:50,000</div> <div>0 500 1,000 1,500 2,000 Metres</div> <div>Doc Number: C250-ARP-EV-MAP-000-004158--P04.00</div> <div>Date: 29/10/13</div>
Map Name Index Map of: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments		
Community Forum Area CFA24: Birmingham Interchange & Chelmsley Wood		



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
- Construction vibration assessment locations
- Construction airborne sound and vibration assessment location
- Baseline measurement locations


labelled with Assessment Location ID reference number
(for details of the assessment results see relevant Vol 5 Appendix SV-003)

(labelled with Measurement Location reference code)

Map Number SV-03-053

Map Name
Assessment and Monitoring Locations for
Construction Sound, Noise & Vibration
Assessments

Community Forum Area CFA24:
Birmingham Interchange & Chelmsley Wood




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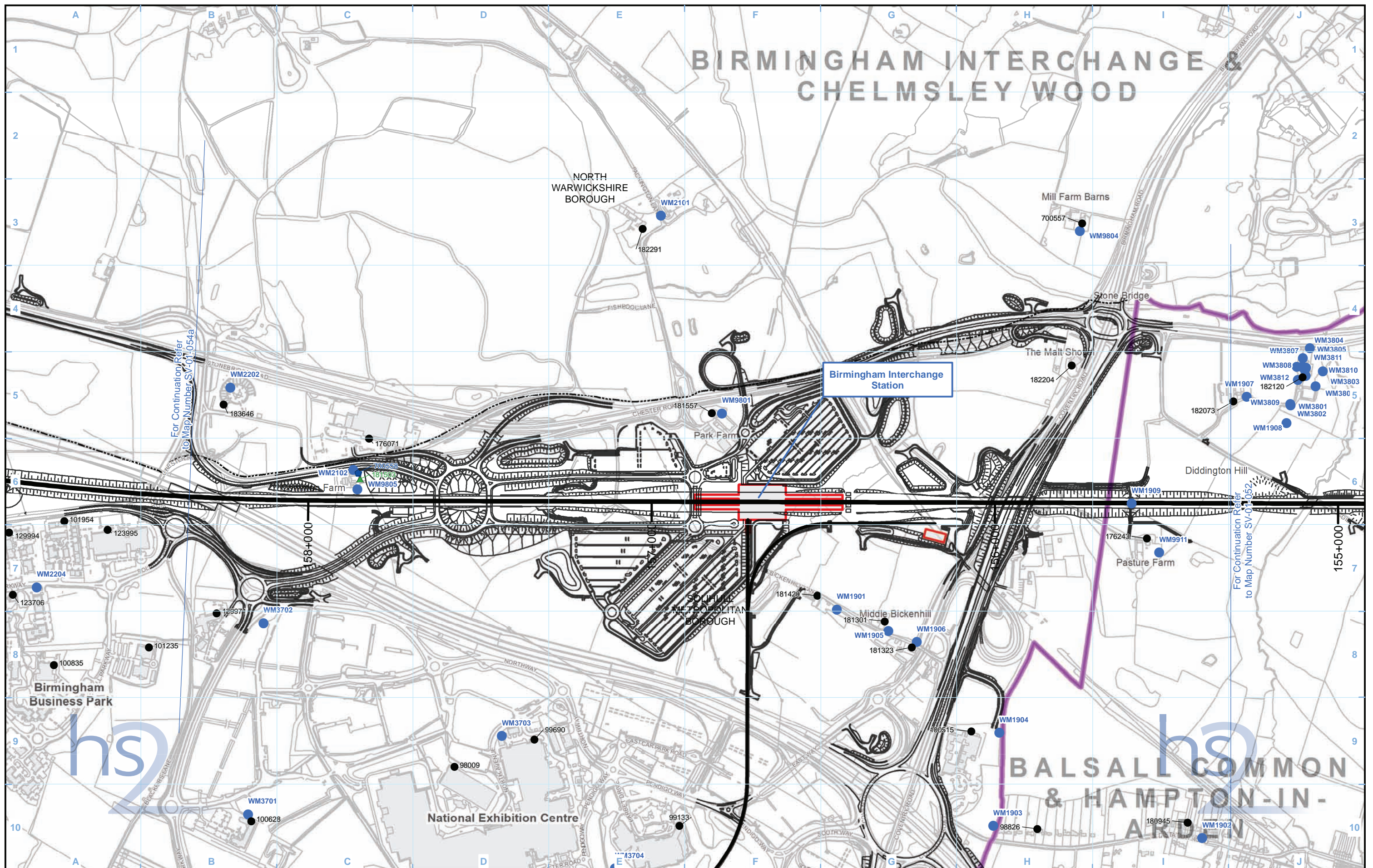


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Metres

Date: 29/10/13



Legend - General features

-  Route in bored tunnel
-  Route in green tunnel
-  Route on surface
-  Depot, station, headhouse or portal building
-  Community forum boundary
-  District/Borough boundary
-  County boundary

Engineering earthworks:

-
- Embankment
- Cutting

Non engineering earthworks:

-
- Embankment
- Cutting

Legend - Sound related features

- Airborne sound assessment location
- ▲ Airborne sound and vibration assessment location
- ⬢ Ground-borne sound and/or vibration assessment location
- ◆ Airborne sound, ground-borne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number

(labelled with Measurement Location reference code)

Map Number

SV-04-053

Map Name

Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Forum Area CFA24:
Birmingham Interchange & Chelmsley Wood

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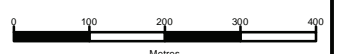
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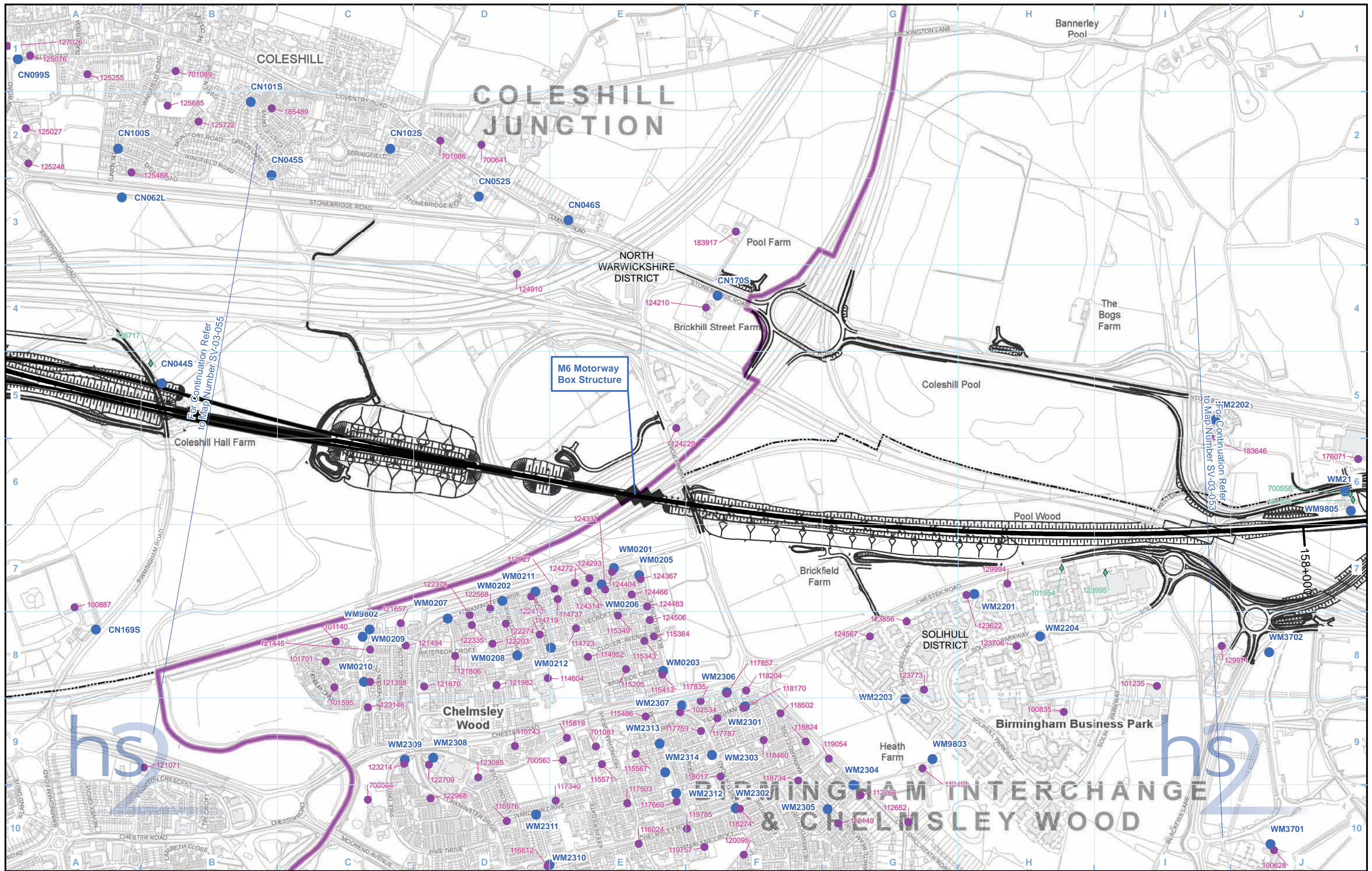
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Doc Number: C250-ARP-EV-MAP-000-003928

Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
- Construction vibration assessment locations
- Construction airborne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see relevant Vol 5 Appendix SV-003)

(labelled with Measurement Location reference code)

Map Number
SV-03-054a

Map Name
Assessment and Monitoring Locations for
Construction Sound, Noise & Vibration
Assessments

Community Forum Area CFA24:
Birmingham Interchange & Chelmsley Wood

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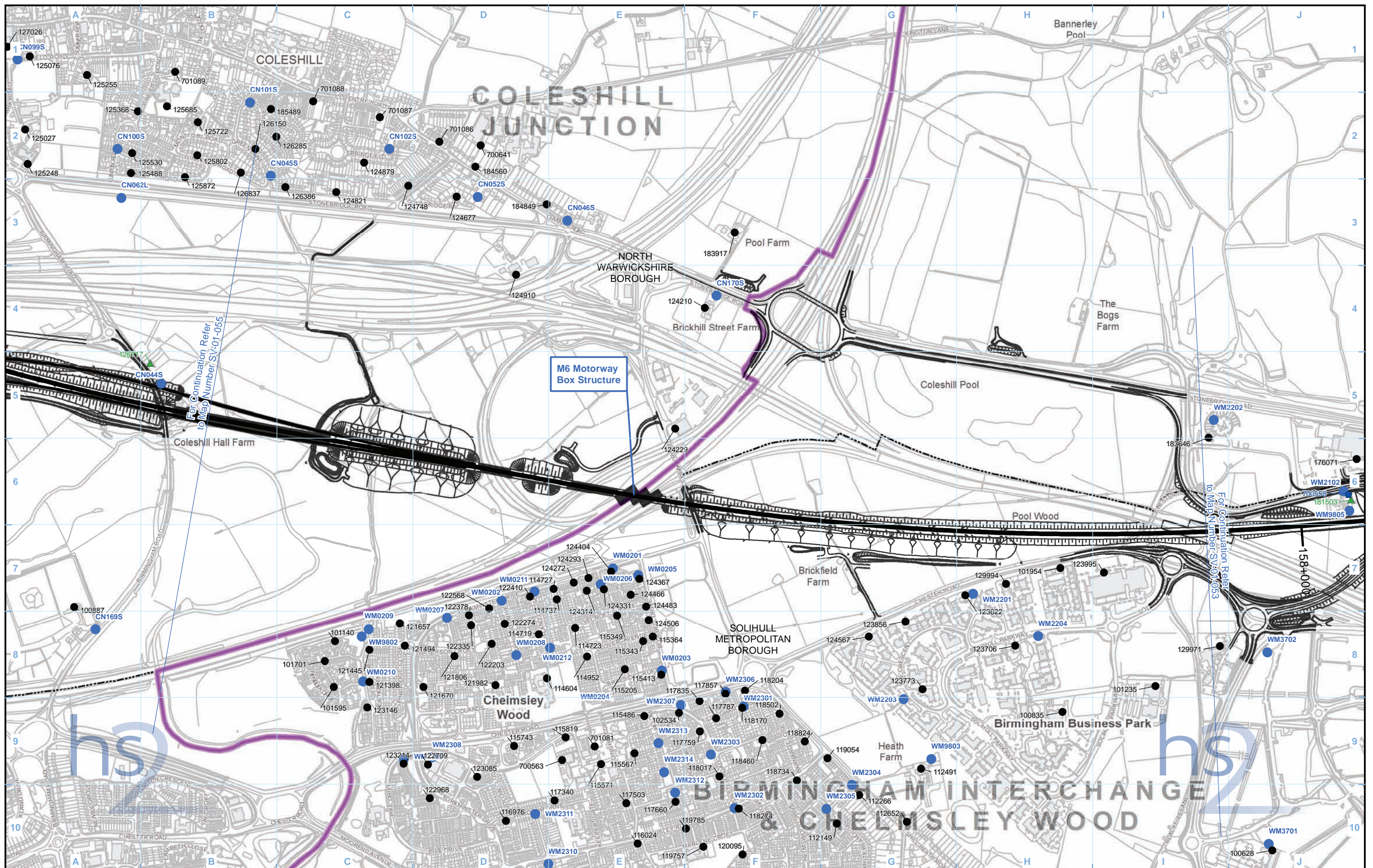
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Doc Number: C250-ARP-EV-MAP-000-003828



Date: 29/10/13



Legend - General features

-  Route in bored tunnel
-  Route in green tunnel
-  Route on surface
-  Depot, station, headhouse or portal building
-  Community forum boundary
-  District/Borough boundary
-  County boundary

Engineering earthworks:

-  Embankment
 Cutting

Non engineering earthworks:

-
- Embankment
- Cutting

Legend - Sound related features

- Airborne sound assessment location
- ▲ Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- ◆ Airborne sound, ground-borne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number

(labelled with Measurement Location reference code)

Map Number

SV-04-054a

Map Name	
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Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Forum Area CFA24:
Birmingham Interchange & Chelmsley Wood



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Date: 29/10/13

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LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

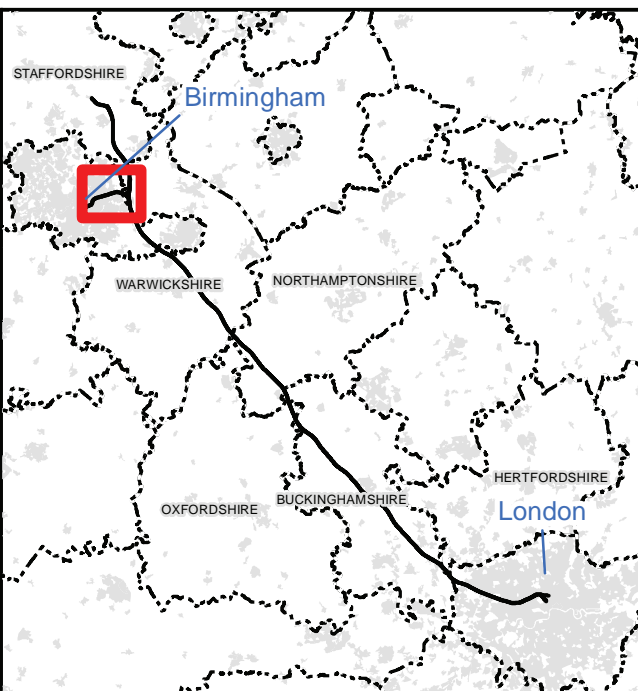
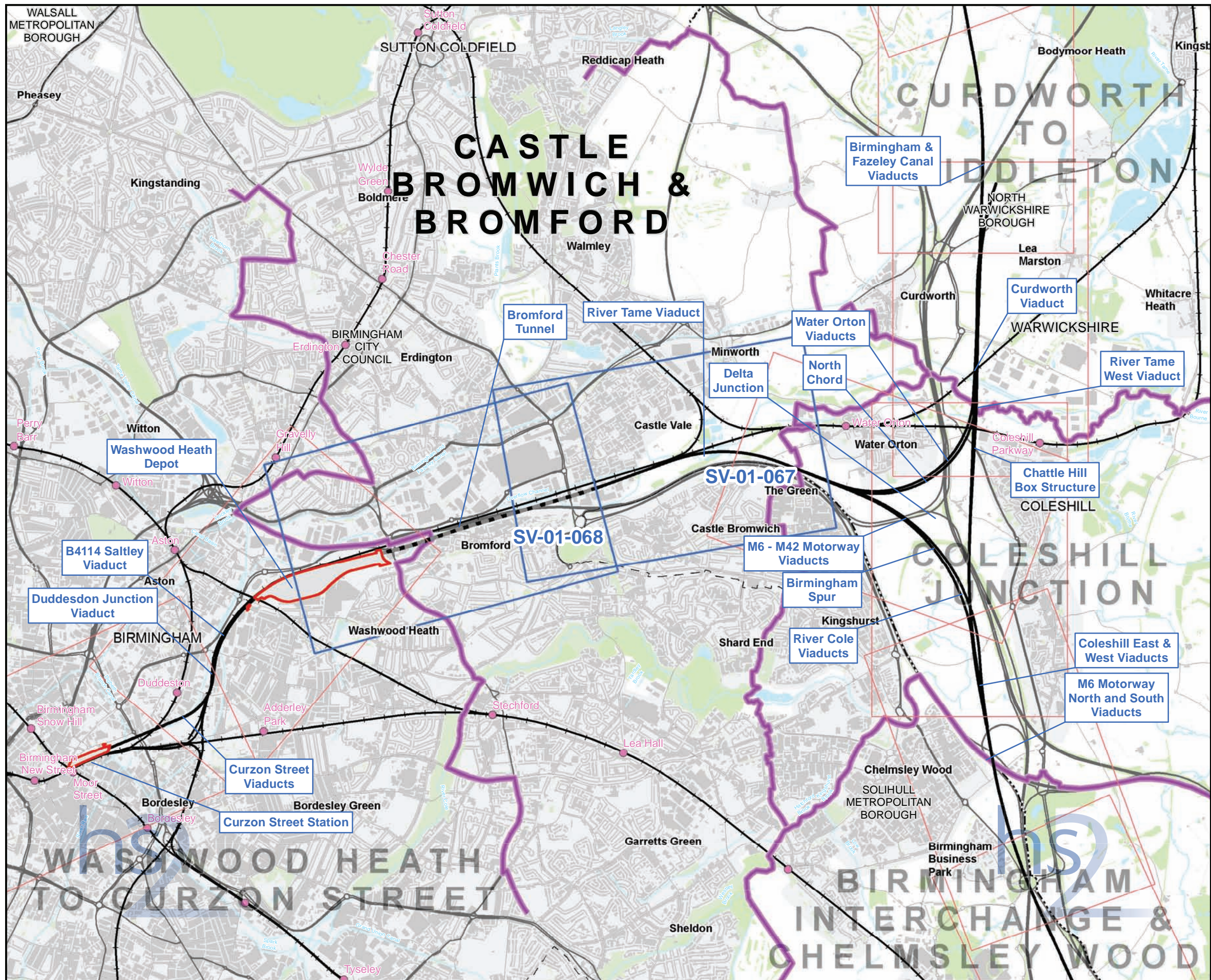
CFA25 | Castle Bromwich and Bromford

SV-01 - Operational Sound Contour Maps and Likely Significant Effects

SV-02 - Operational Airborne Noise and Vibration Impacts and Likely Significant Effects
(with Assessment Locations)

SV-03 - Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

SV-04 - Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend	
	Route in tunnel
	Route on surface
	Depot, station, headhouse or portal building
	Community forum boundary
	Existing railway station
	County boundary
	District/Borough boundary
	Map sheets included in this community forum
	Map sheets not included in this community forum

Map Number	SV-01-INDEX-CFA25
Map Name	Index Map of: Operational Sound Contour Maps and Likely Significant Effects
Community Forum Area CFA25: Castle Bromwich & Bromford	

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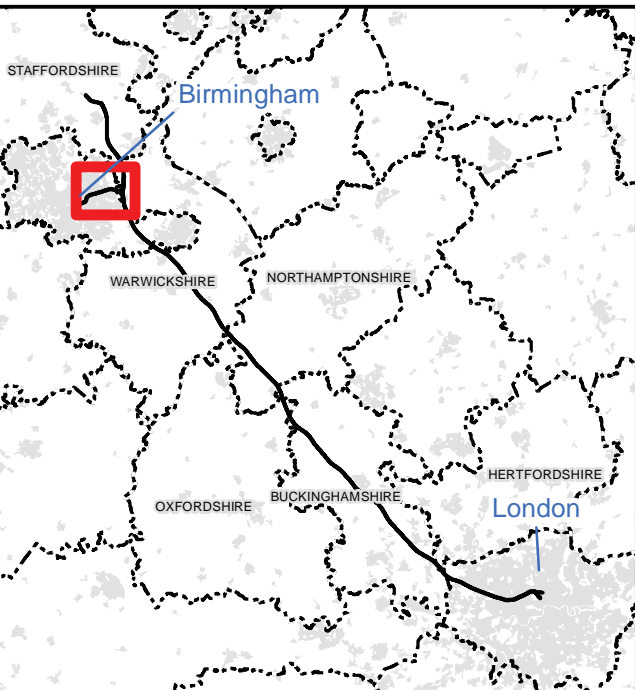
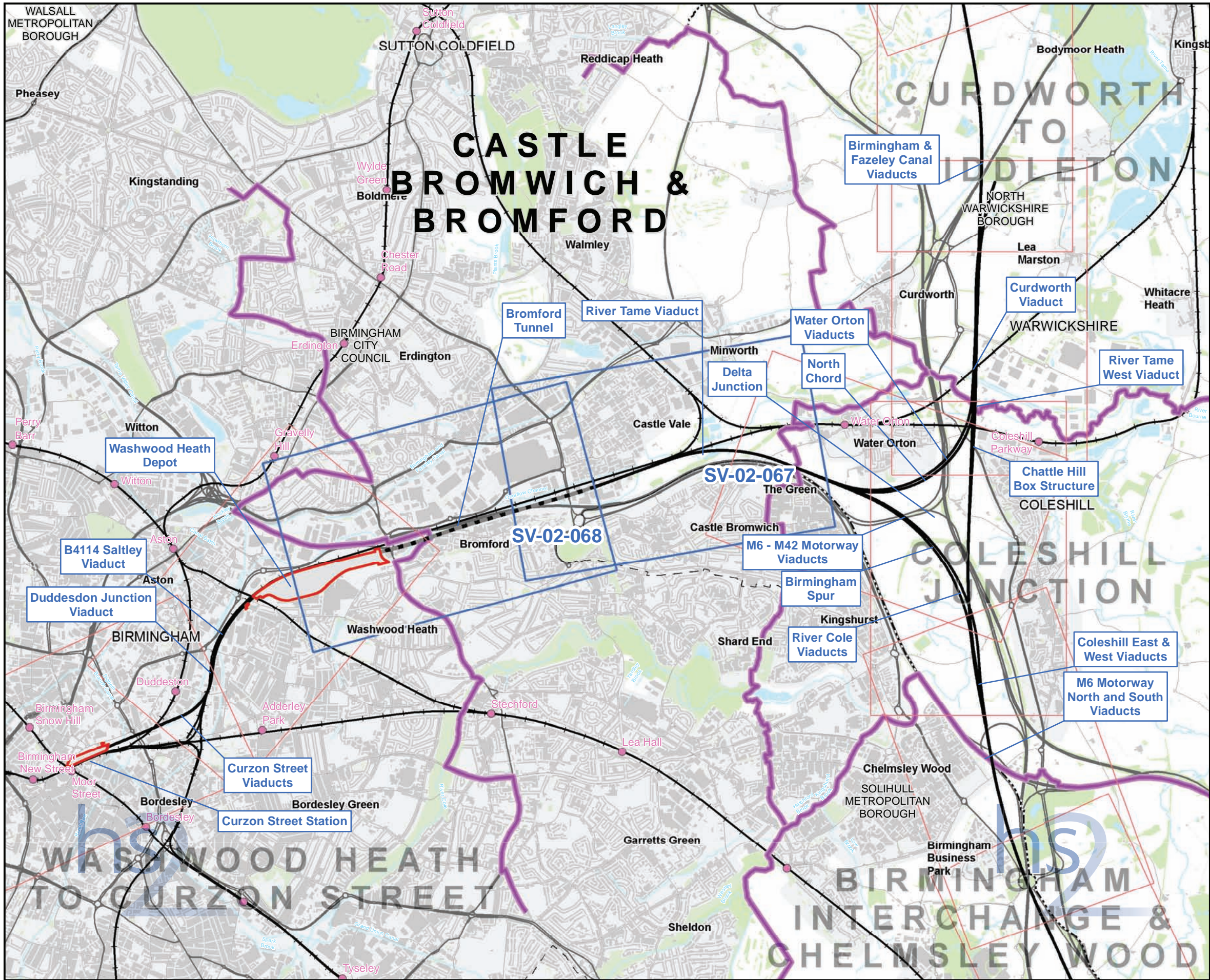
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Doc Number: C250-ARP-EV-MAP-000-004082--P04.00

Scale at A3: 1:50,000

0 500 1,000 1,500 2,000 Metres

Date: 29/10/13



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

Key items on the map include the following:

- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
- the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
- sound contours representing sound produced by the new railway (displayed in a simpler manner than on SV-01 in order not to obscure other features on the map series);
- the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
- labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Route in tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

Existing railway station

County boundary

District/Borough boundary

Map sheets included in this community forum

Map sheets not included in this community forum

Map Number

SV-02-INDEX-CFA25

Map Name

Index Map of:
Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA25:

Castle Bromwich & Bromford

hs2

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London SW1E 5DU.

Scale at A3: 1:50,000

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500

1,000

1,500

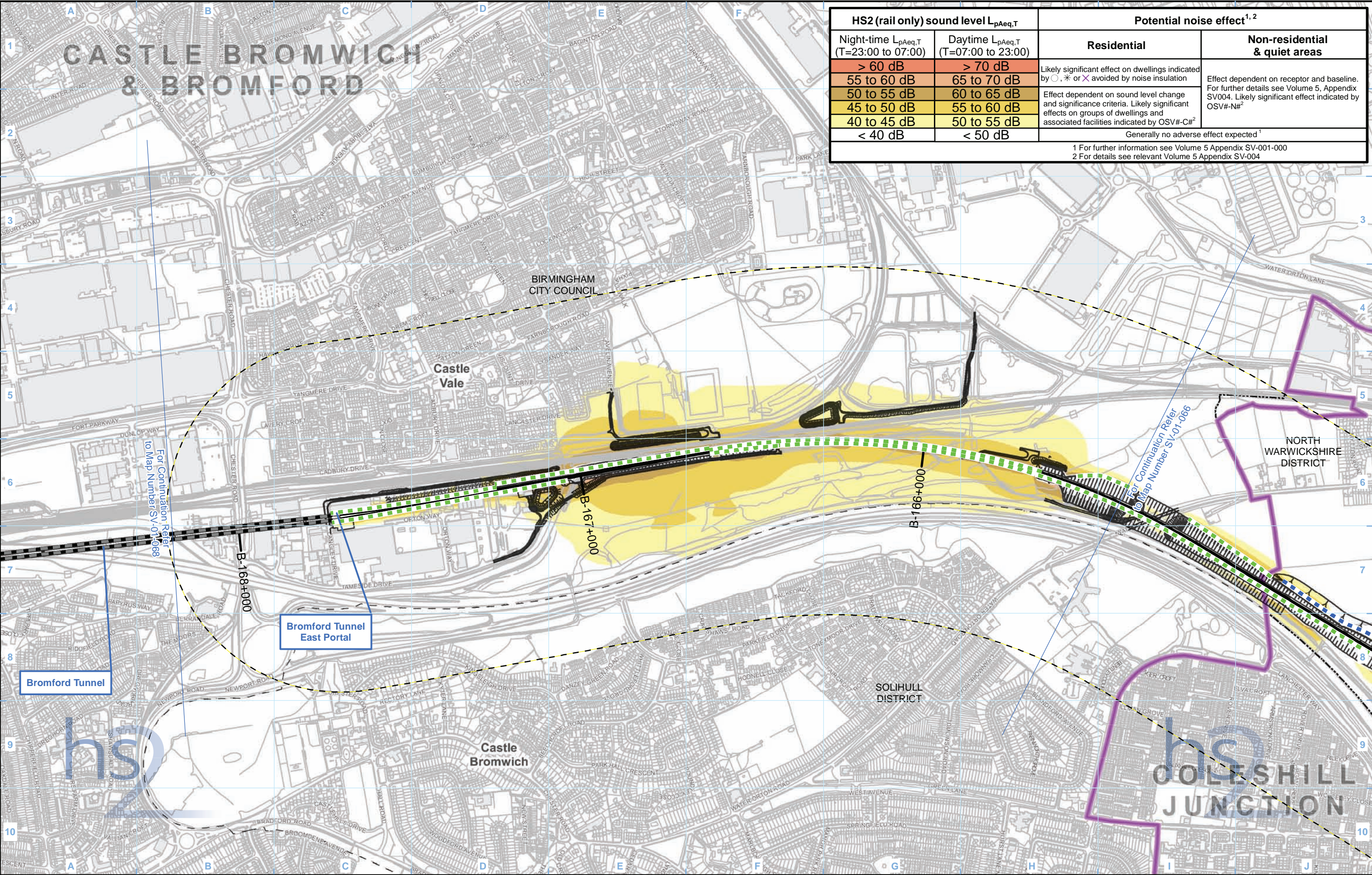
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Metres

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Doc Number: C250-ARP-EV-MAP-000-004107--P04.00

Date: 29/10/13



HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1, 2}	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 60 dB	> 70 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
55 to 60 dB	65 to 70 dB		
50 to 55 dB	60 to 65 dB		
45 to 50 dB	55 to 60 dB		
40 to 45 dB	50 to 55 dB		
< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
1 For further information see Volume 5 Appendix SV-001-000			
2 For details see relevant Volume 5 Appendix SV-004			

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Legend - Sound related features

- Airborne sound study area
- Potential additional noise insulation (triggered by maximum sound levels at night)¹
- Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
- Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

* Labelled with total barrier height above rail level

Map Number

SV-01-067

Map Name

Operational Sound Contour Maps and Likely Significant Effects

Community Forum Area CFA25:
Castle Bromwich & Bromford

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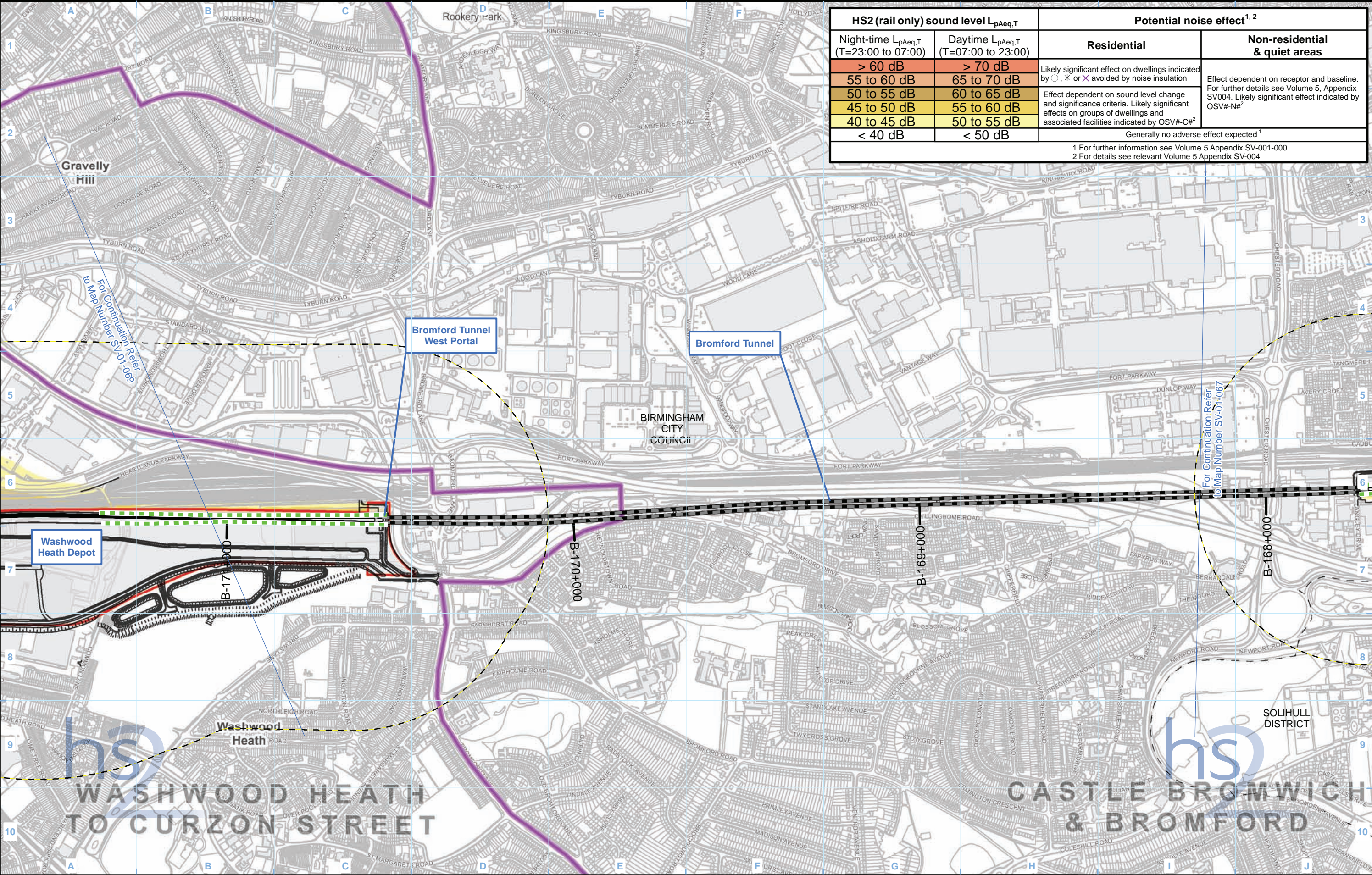
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Doc Number: C250-ARP-EV-MAP-000-003618

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Date: 29/10/13



HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1, 2}	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 60 dB	> 70 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
55 to 60 dB	65 to 70 dB		
50 to 55 dB	60 to 65 dB	Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
45 to 50 dB	55 to 60 dB		
40 to 45 dB	50 to 55 dB		
< 40 dB	< 50 dB		
Generally no adverse effect expected ¹			
1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-004			

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Airborne sound study area

- Potential additional noise insulation (triggered by maximum sound levels at night)¹
- Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
- Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

* Labelled with total barrier height above rail level

Map Number

SV-01-068

Map Name

Operational Sound Contour Maps and Likely Significant Effects

Community Forum Area CFA25:

Castle Bromwich & Bromford



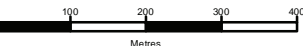
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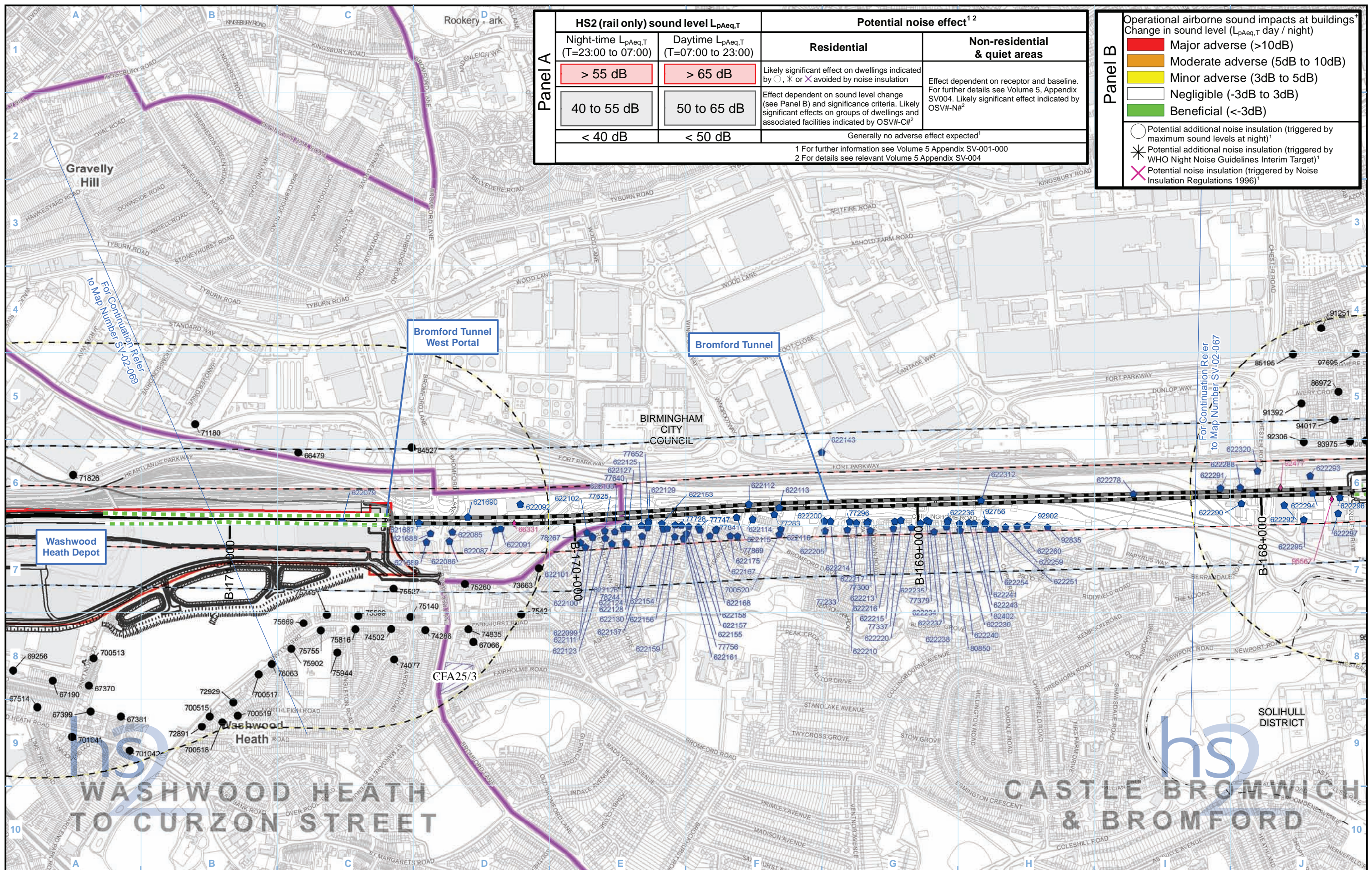
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Scale at A3: 1:10,000



Date: 29/10/13



Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect ^{1 2}	
	Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, * or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
	40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
	< 40 dB	< 50 dB	Generally no adverse effect expected ¹	
	1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-004			

Panel B

Operational airborne sound impacts at buildings⁺
Change in sound level ($L_{pAeq,T}$ day / night)

Major adverse (>10dB)

Moderate adverse (5dB to 10dB)

Minor adverse (3dB to 5dB)

Negligible (-3dB to 3dB)

Beneficial (<-3dB)

○ Potential additional noise insulation (triggered by maximum sound levels at night)¹

✱ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹

✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

Legend - General features

Route in bored tunnel

Route in green tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

District/Borough boundary

County boundary

Engineering earthworks: Non engineering earthworks:

Embankment

Cutting

Embankment

Cutting

* Residential buildings only
* Labelled with total barrier height above rail level

Legend - Sound related features

Committed developments (label as CFA#/#)

Envisaged mitigation to avoid / reduce significant noise effects:

Landscaping and/or fence barriers*

Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:

Other environmental features e.g. landscaping

Engineering e.g. cuttings

Airborne sound study area

Ground-borne sound & vibration study area (residential and non-residential)

Ground-borne sound & vibration study area (highly sensitive non-residential)

Airborne sound assessment location

Airborne sound and vibration assessment location

Ground-borne sound and/or vibration assessment location

Airborne sound, ground-borne sound and vibration assessment location

Minor ground-borne noise or vibration impact*

Map Number

SV-02-068

Map Name

Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA25:
Castle Bromwich & Bromford

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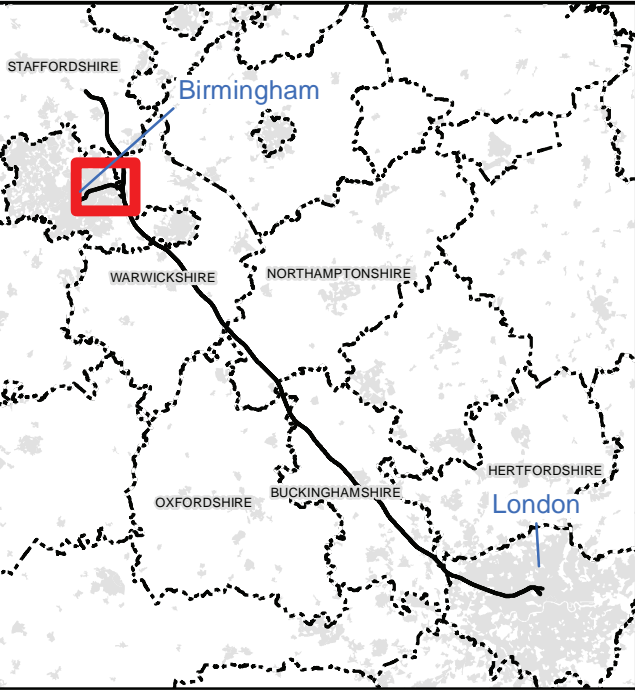
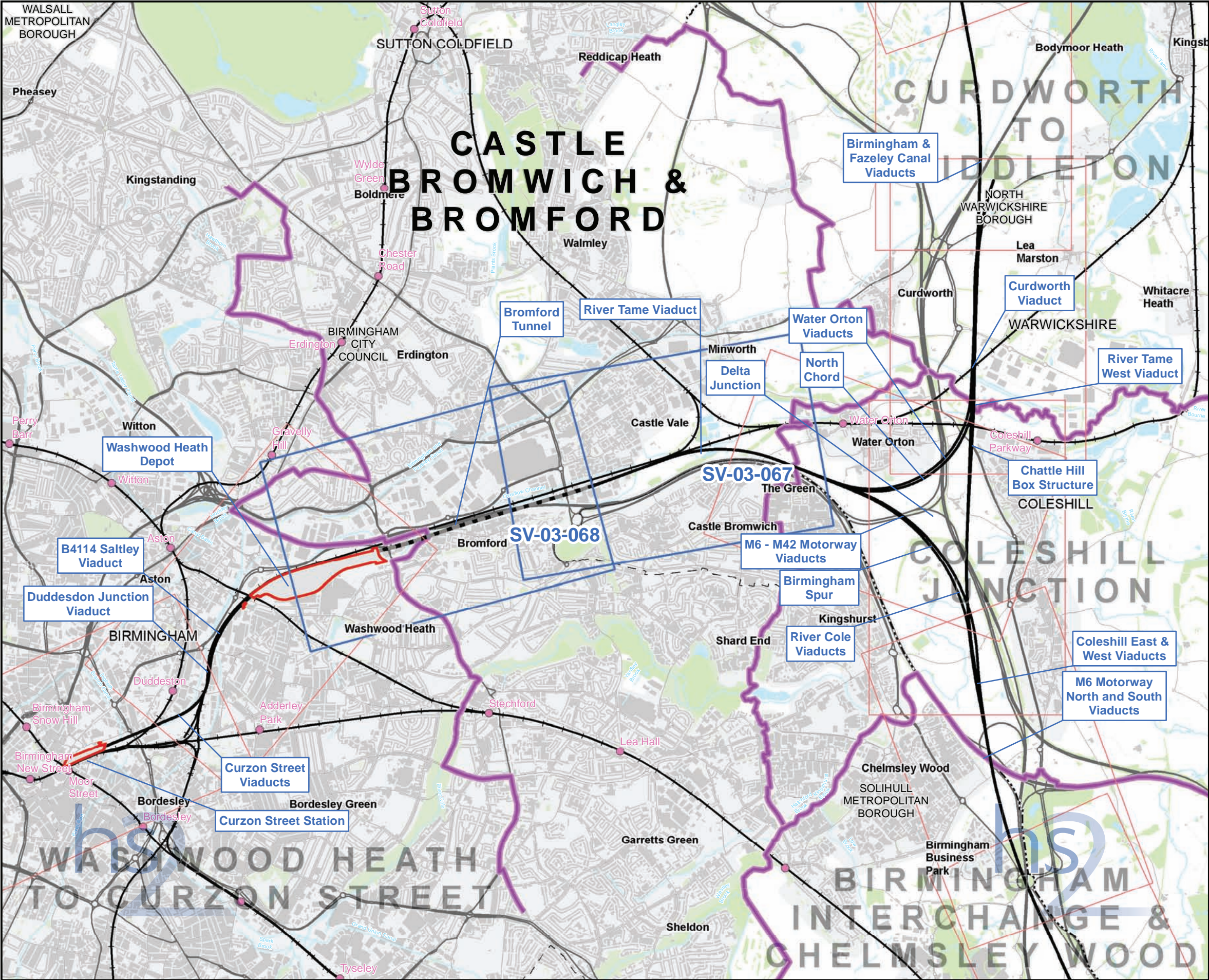
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Doc Number: C250-ARP-EV-MAP-000-003729

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Date: 31/10/13



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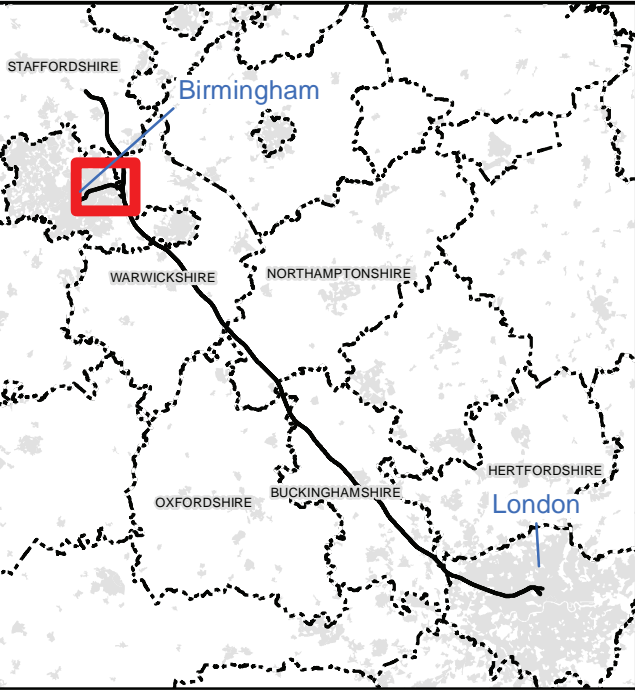
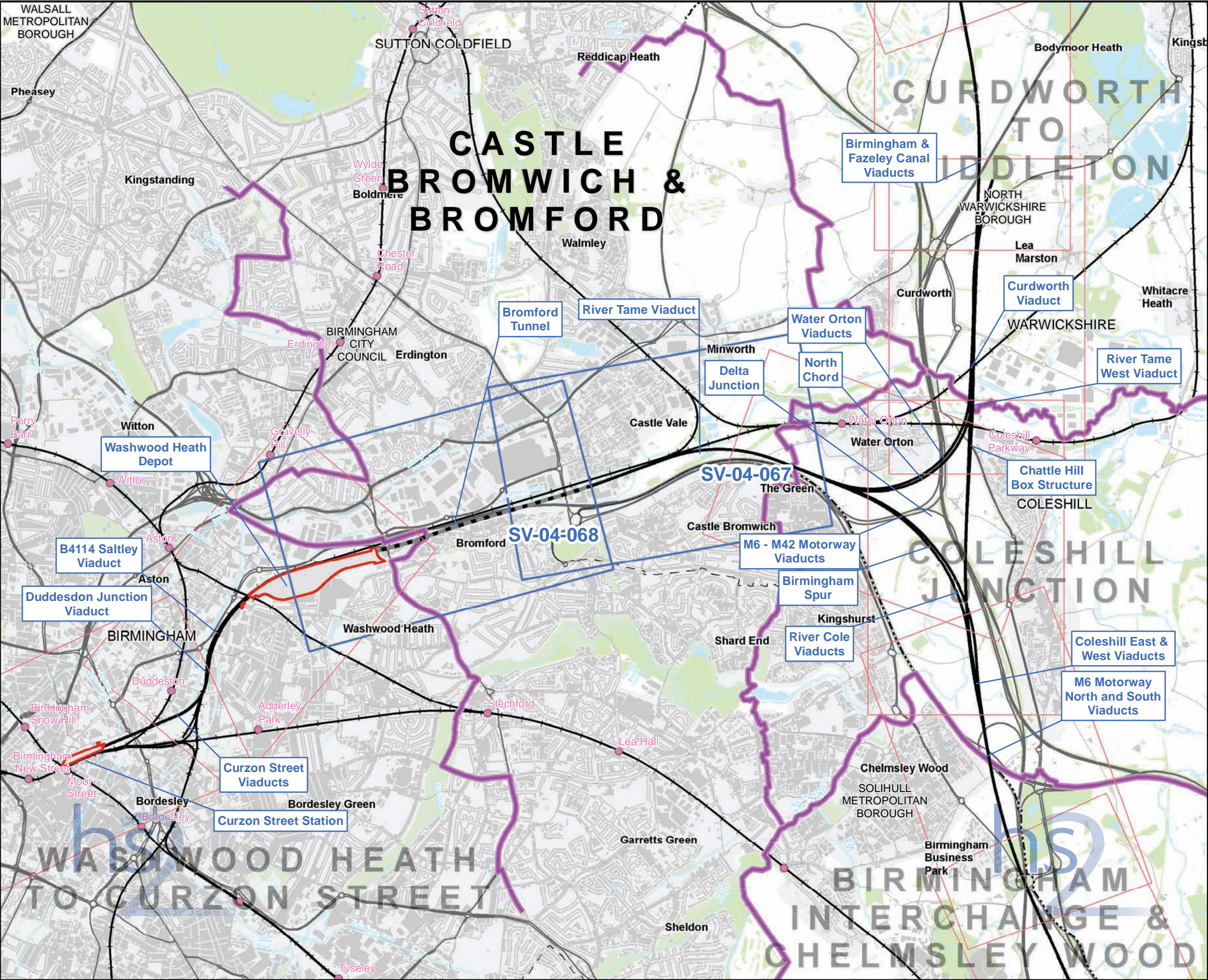
The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-003 and Volume 5: Appendix SV-002.

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend <ul style="list-style-type: none">Route in tunnelRoute on surfaceDepot, station, headhouse or portal buildingCommunity forum boundaryExisting railway stationCounty boundaryDistrict/Borough boundaryMap sheets included in this community forumMap sheets not included in this community forum	<p>Map Number: SV-03-INDEX-CFA25</p> <p>Map Name: Index Map of: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments</p> <p>Community Forum Area CFA25: Castle Bromwich & Bromford</p>	<p>hs2</p> <p>HS2 Ltd accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.</p> <p>Registered in England. Registration number 06791686. Registered office: Eland House, Bressenden Place, London SW1E 5DU.</p> <p>Scale at A3: 1:50,000</p> <p>0 500 1,000 1,500 2,000 Metres</p> <p>© Crown copyright and database rights 2013 Ordnance Survey Licence Number 100049190.</p> <p>Doc Number: C250-ARP-EV-MAP-000-004133-P06.00</p> <p>Date: 29/10/13</p>
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Map Series Information:

The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004 and Volume 5: Appendix SV-002.


The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

- Main Map Legend**
- Route in tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community forum boundary
 - Existing railway station
 - County boundary
 - District/Borough boundary
 - Map sheets included in this community forum
 - Map sheets not included in this community forum

Map Number	SV-04-INDEX-CFA25
Map Name	Index Map of: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments
Community Forum Area CFA25:	Castle Bromwich & Bromford




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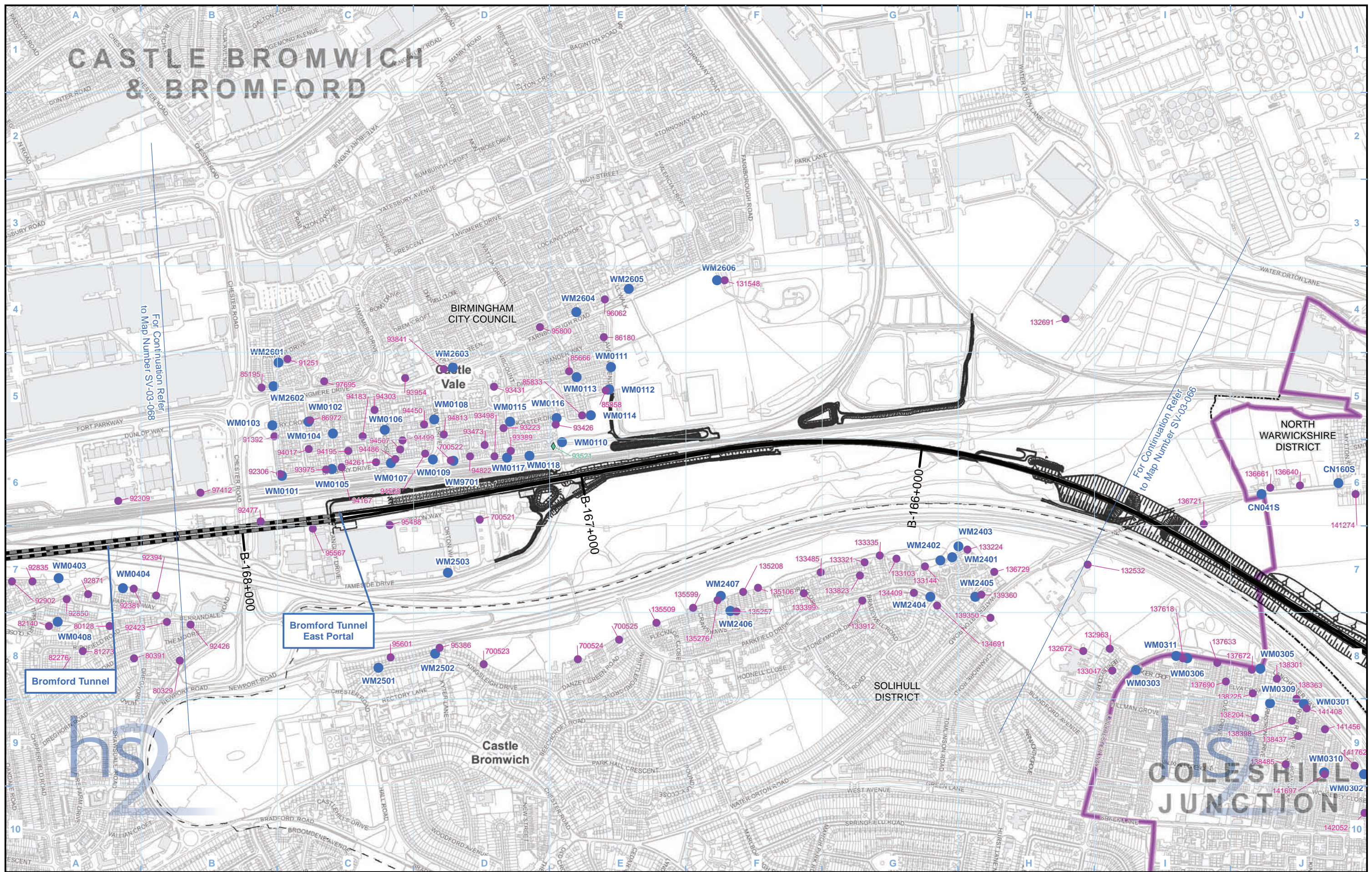


Scale at A3: 1:50,000



Metres

Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

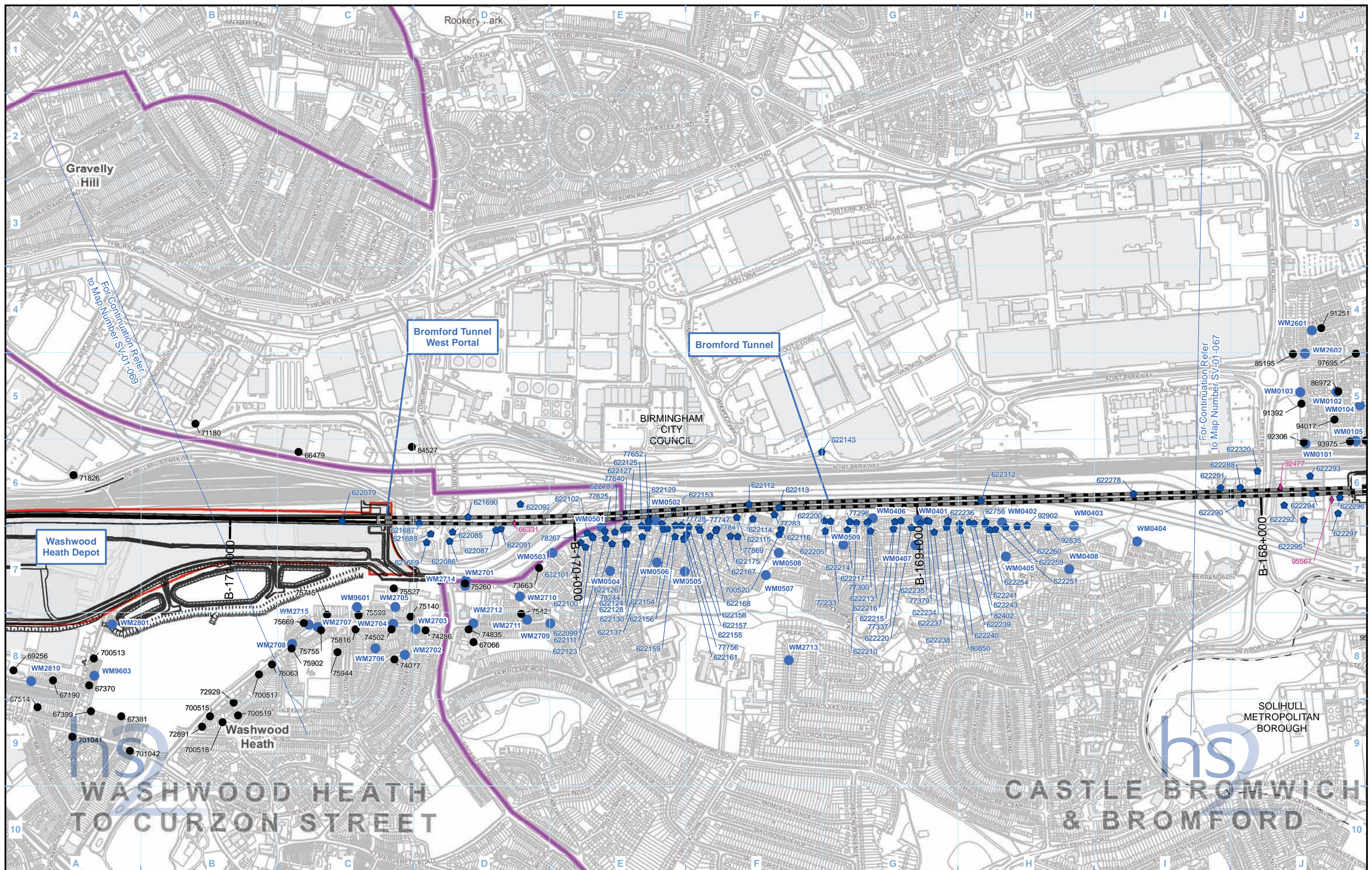
- Construction airborne sound assessment location
- Construction vibration assessment locations
- Construction airborne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see relevant Vol 5 Appendix SV-003)

(labelled with Measurement Location reference code)

Map Number	SV-03-067
Map Name	Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments
Community Forum Area CFA25: Castle Bromwich & Bromford	

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Doc Number: C250-ARP-EV-MAP-000-003829	Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Legend - Sound related features

- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Baseline measurement locations

Legend - Engineering earthworks:

- Embankment
- Cutting

Legend - Non engineering earthworks:

- Embankment
- Cutting

labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV004)

(labelled with Measurement Location reference code)

Map Number

SV-04-068

Map Name

Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Forum Area CFA25:
Castle Bromwich & Bromford

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Scale at A3: 1:10,000

Metres

Date: 29/10/13

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LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

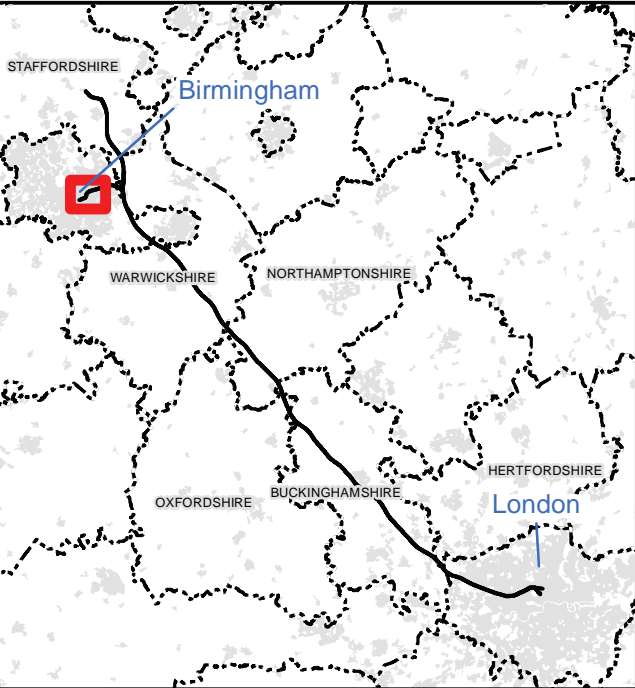
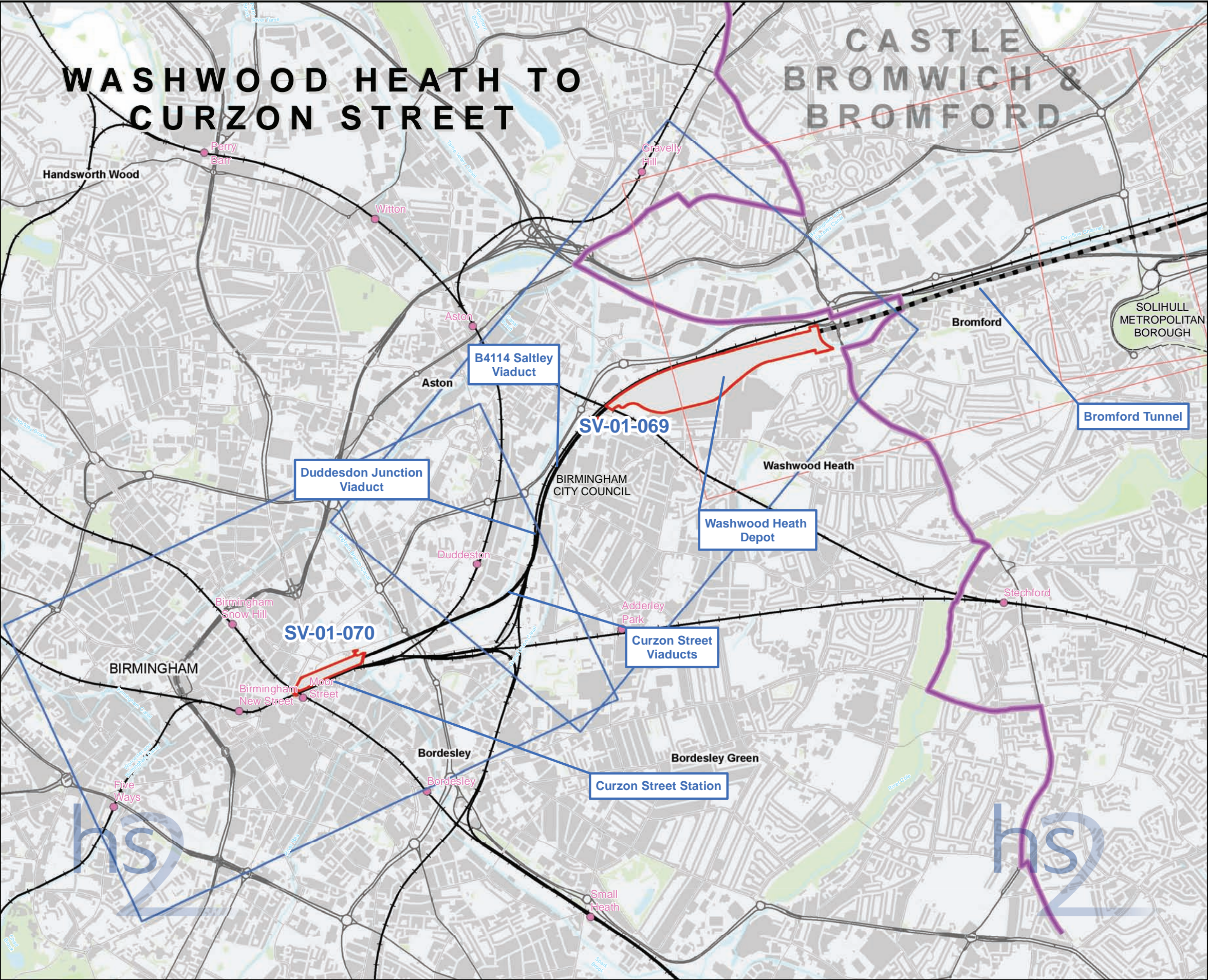
CFA26 | Washwood Heath to Curzon Street

SV-01 - Operational Sound Contour Maps and Likely Significant Effects

SV-02 - Operational Airborne Noise and Vibration Impacts and Likely Significant Effects
(with Assessment Locations)

SV-03 - Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

SV-04 - Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Route in tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

Existing railway station

County boundary

District/Borough boundary

Map sheets included in this community forum

Map sheets not included in this community forum

hs2

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Map NumberSV-01-INDEX-CFA26

Map NameIndex Map of:
Operational Sound Contour Maps and
Likely Significant Effects

Community Forum Area CFA26:
Washwood Heath to Curzon Street

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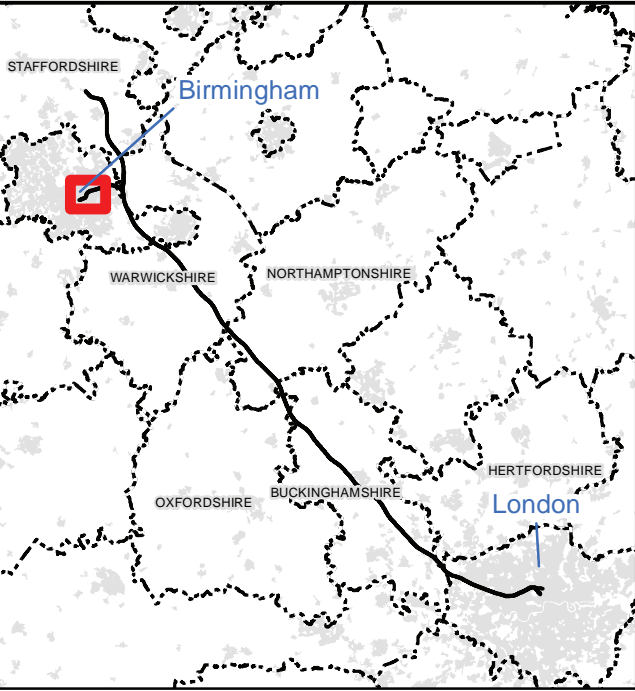
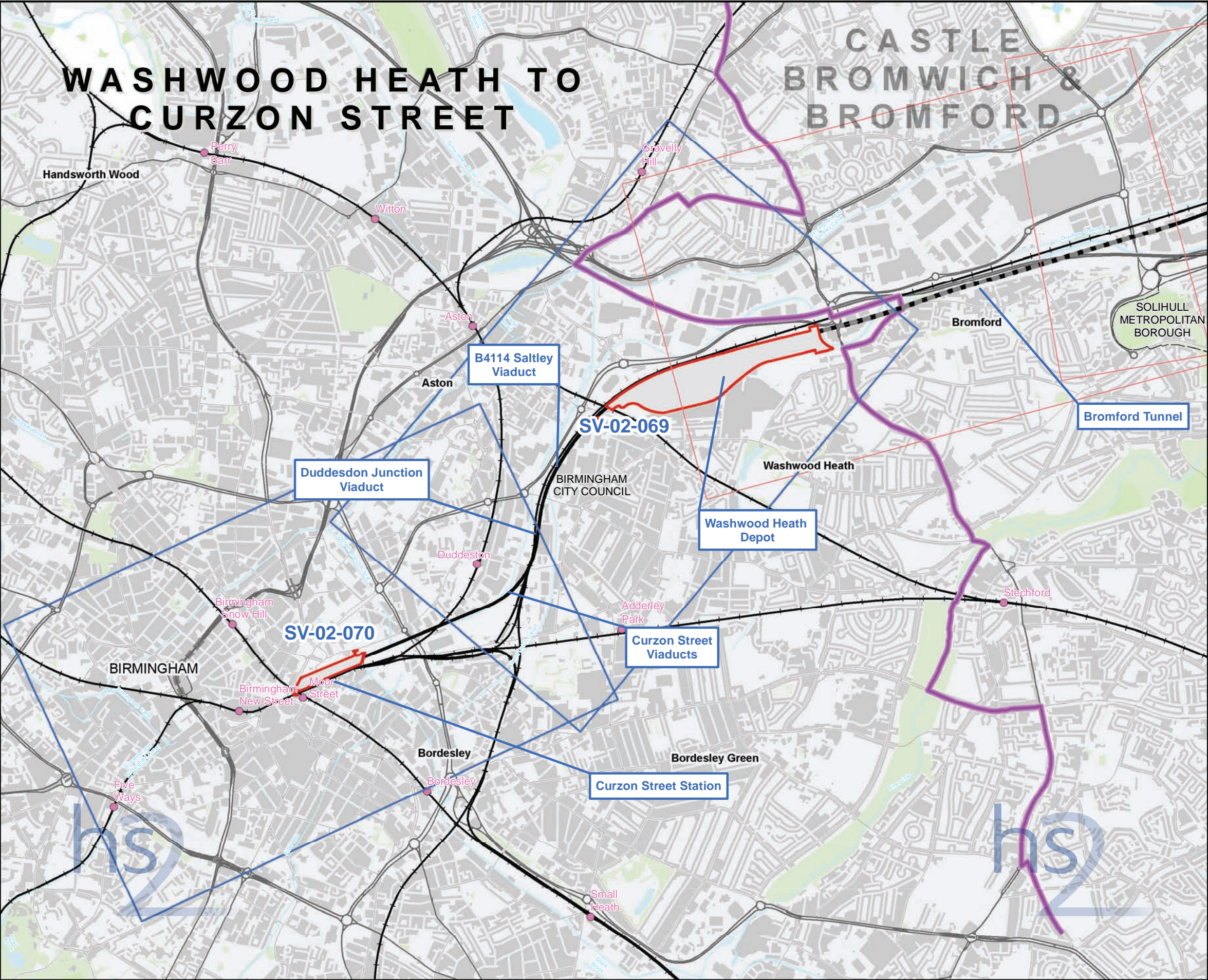
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Doc Number: C250-ARP-EV-MAP-000-004083--P04.00

Date: 29/10/13



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

Key items on the map include the following:

- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
- the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
- sound contours representing sound produced by the new railway (displayed in a simpler manner than on SV-01 in order not to obscure other features on the map series);
- the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
- labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Route in tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

Existing railway station

County boundary

District/Borough boundary

Map sheets included in this community forum

Map sheets not included in this community forum

hs2

hs2

Map Number

SV-02-INDEX-CFA26

Map Name

Index Map of:
Operational Noise and Vibration Impacts and Likely
Significant Effects (with Assessment Locations)

Community Forum Area CFA26:
Washwood Heath to Curzon Street

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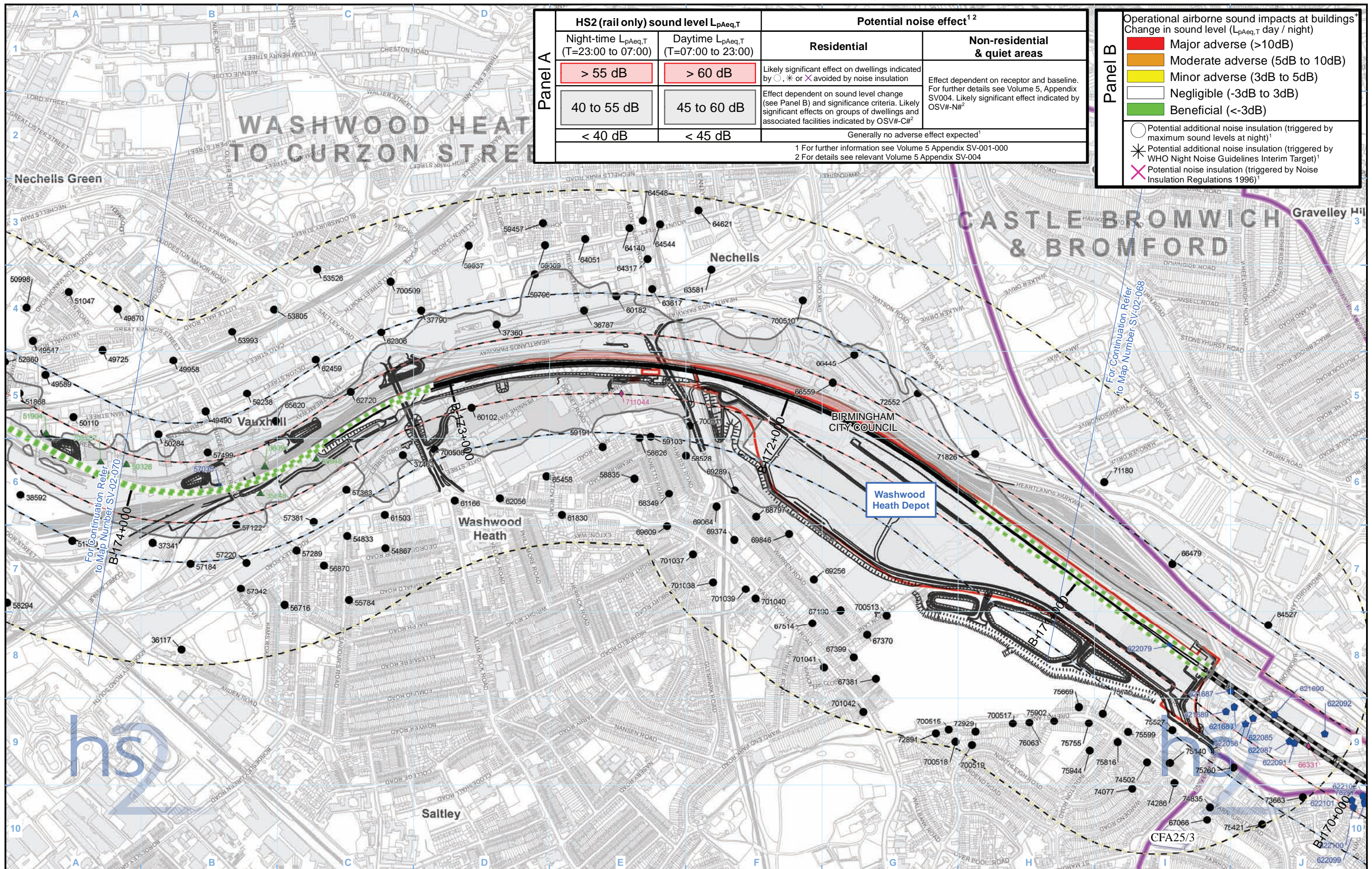
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900

1,200

Metres

Date: 29/10/13



Panel A	HS2 (rail only) sound level L _{pAeq,T}		Potential noise effect ^{1 2}	
	Night-time L _{pAeq,T} (T=23:00 to 07:00)	Daytime L _{pAeq,T} (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 60 dB	Likely significant effect on dwellings indicated by ○, * or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
	40 to 55 dB	45 to 60 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
	< 40 dB	< 45 dB	Generally no adverse effect expected ¹	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings*
Change in sound level (L_{pAeq,T} day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

○ Potential additional noise insulation (triggered by maximum sound levels at night)¹
✱ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level

Legend - Sound related features

- Committed developments (label as CFA#/#)
- Envisaged mitigation to avoid / reduce significant noise effects:
 - Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
 - Envisaged measures further reducing noise effects:
 - Other environmental features e.g. landscaping
 - Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact*

Map Number

SV-02-069

Map Name

Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA26:
Washwood Heath to Curzon Street

hs2

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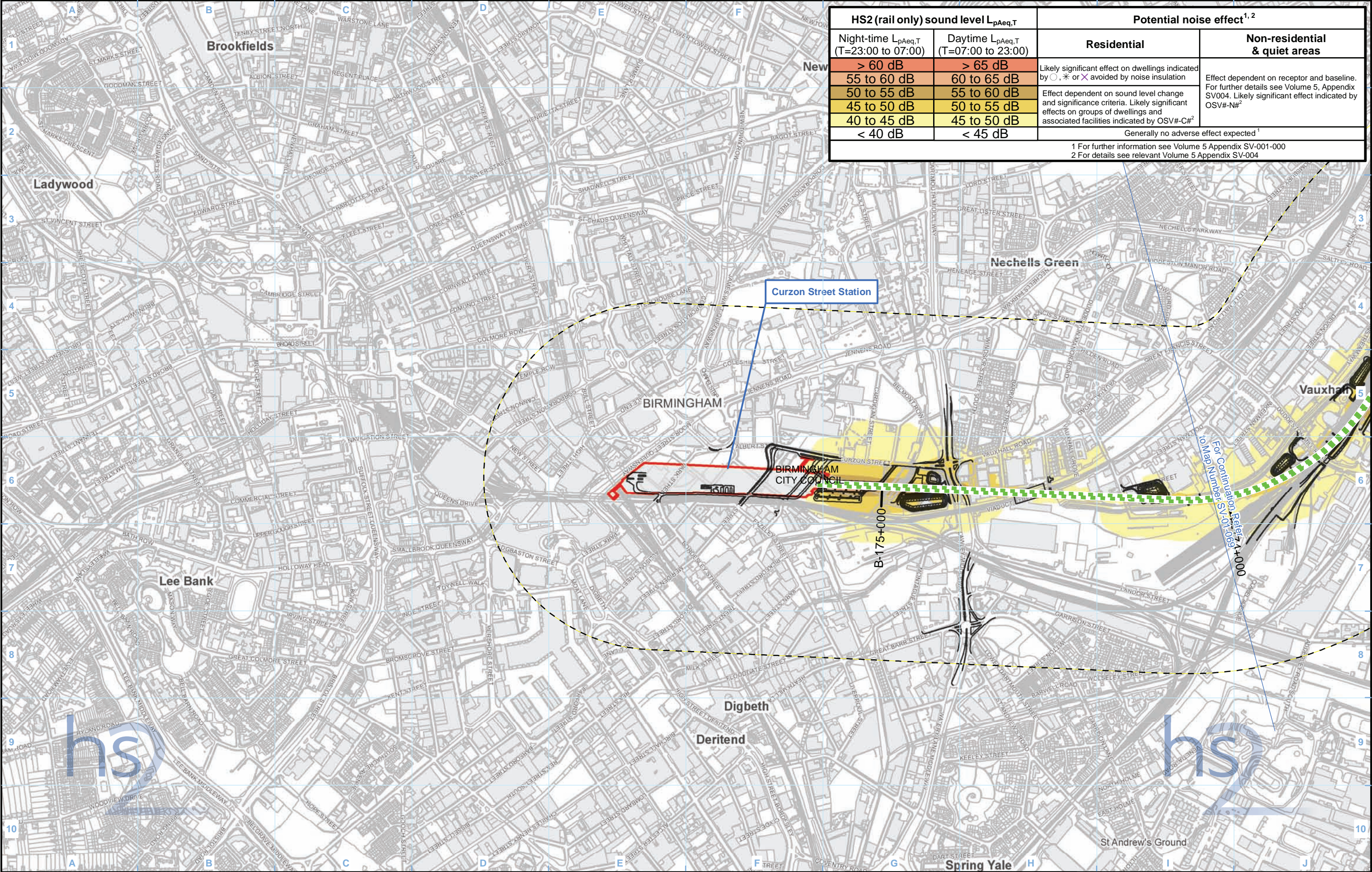
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Doc Number: C250-ARP-EV-MAP-000-003730

Scale at A3: 1:10,000

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Date: 31/10/13



HS2 (rail only) sound level L _{pAeq,T}		Potential noise effect ^{1, 2}	
Night-time L _{pAeq,T} (T=23:00 to 07:00)	Daytime L _{pAeq,T} (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 60 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
55 to 60 dB	60 to 65 dB		
50 to 55 dB	55 to 60 dB	Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
45 to 50 dB	50 to 55 dB		
40 to 45 dB	45 to 50 dB		
< 40 dB	< 45 dB		
Generally no adverse effect expected ¹			
1 For further information see Volume 5 Appendix SV-001-000			
2 For details see relevant Volume 5 Appendix SV-004			

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Envisaged mitigation to avoid / reduce significant noise effects:
 - Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
 - Other environmental e.g. landscaping
 - Engineering e.g. cuttings

- Airborne sound study area
- Potential additional noise insulation (triggered by maximum sound levels at night)¹
- Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹
- Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

* Labelled with total barrier height above rail level

Map Number

SV-01-070

Map Name

Operational Sound Contour Maps and Likely Significant Effects

Community Forum Area CFA26:
Washwood Heath to Curzon Street

hs2

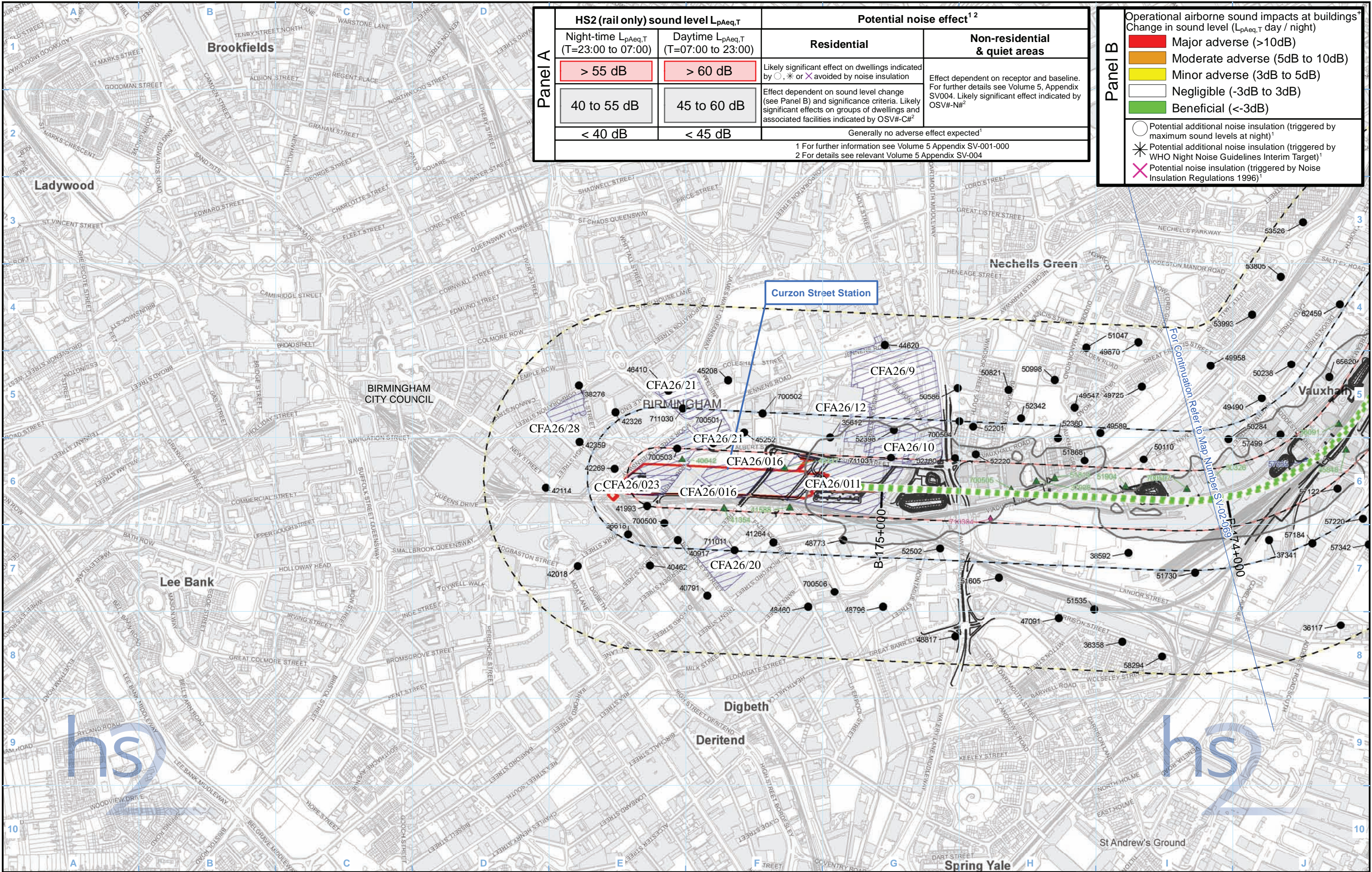
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Scale at A3: 1:10,000

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Metres

Doc Number: C250-ARP-EV-MAP-000-003621

Date: 29/10/13



Panel A	HS2 (rail only) sound level L _{pAeq,T}		Potential noise effect ^{1 2}	
	Night-time L _{pAeq,T} (T=23:00 to 07:00)	Daytime L _{pAeq,T} (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 60 dB	Likely significant effect on dwellings indicated by ○, ✱ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# ²
	40 to 55 dB	45 to 60 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ²	
	< 40 dB	< 45 dB	Generally no adverse effect expected ¹	
	1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-004			

Panel B

Operational airborne sound impacts at buildings*
Change in sound level (L_{pAeq,T} day / night)

Major adverse (>10dB)

Moderate adverse (5dB to 10dB)

Minor adverse (3dB to 5dB)

Negligible (-3dB to 3dB)

Beneficial (<-3dB)

○ Potential additional noise insulation (triggered by maximum sound levels at night)¹

✱ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹

✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)¹

Legend - General features

Route in bored tunnel

Route in green tunnel

Route on surface

Depot, station, headhouse or portal building

Community forum boundary

District/Borough boundary

County boundary

Engineering earthworks:

Embankment

Cutting

 Non engineering earthworks:

Embankment

Cutting

* Residential buildings only
* Labelled with total barrier height above rail level

Legend - Sound related features

Committed developments (label as CFA#/#)

Envisaged mitigation to avoid / reduce significant noise effects:

Landscaping and/or fence barriers*

Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:

Other environmental features e.g. landscaping

Engineering e.g. cuttings

Airborne sound study area

Ground-borne sound & vibration study area (residential and non-residential)

Ground-borne sound & vibration study area (highly sensitive non-residential)

Airborne sound assessment location

Airborne sound and vibration assessment location

Ground-borne sound and/or vibration assessment location

Airborne sound, ground-borne sound and vibration assessment location

Minor ground-borne noise or vibration impact*

Map Number

SV-02-070

Map Name

Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Forum Area CFA26: Washwood Heath to Curzon Street

hs2

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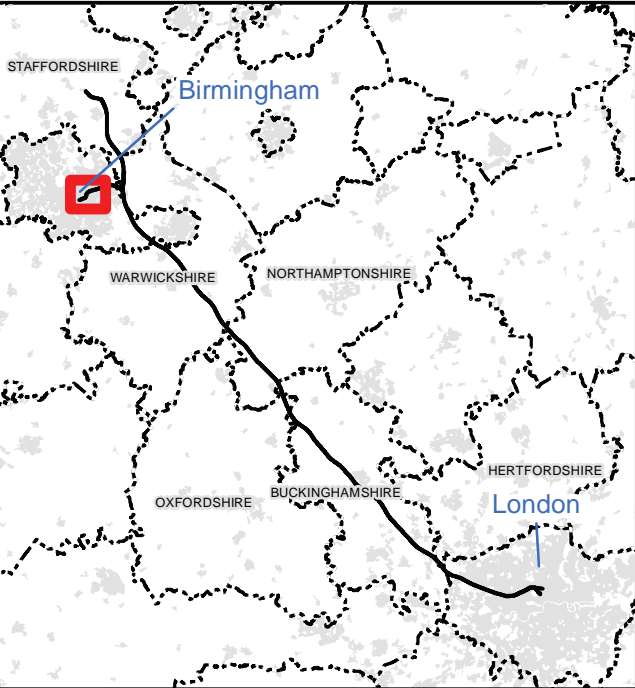
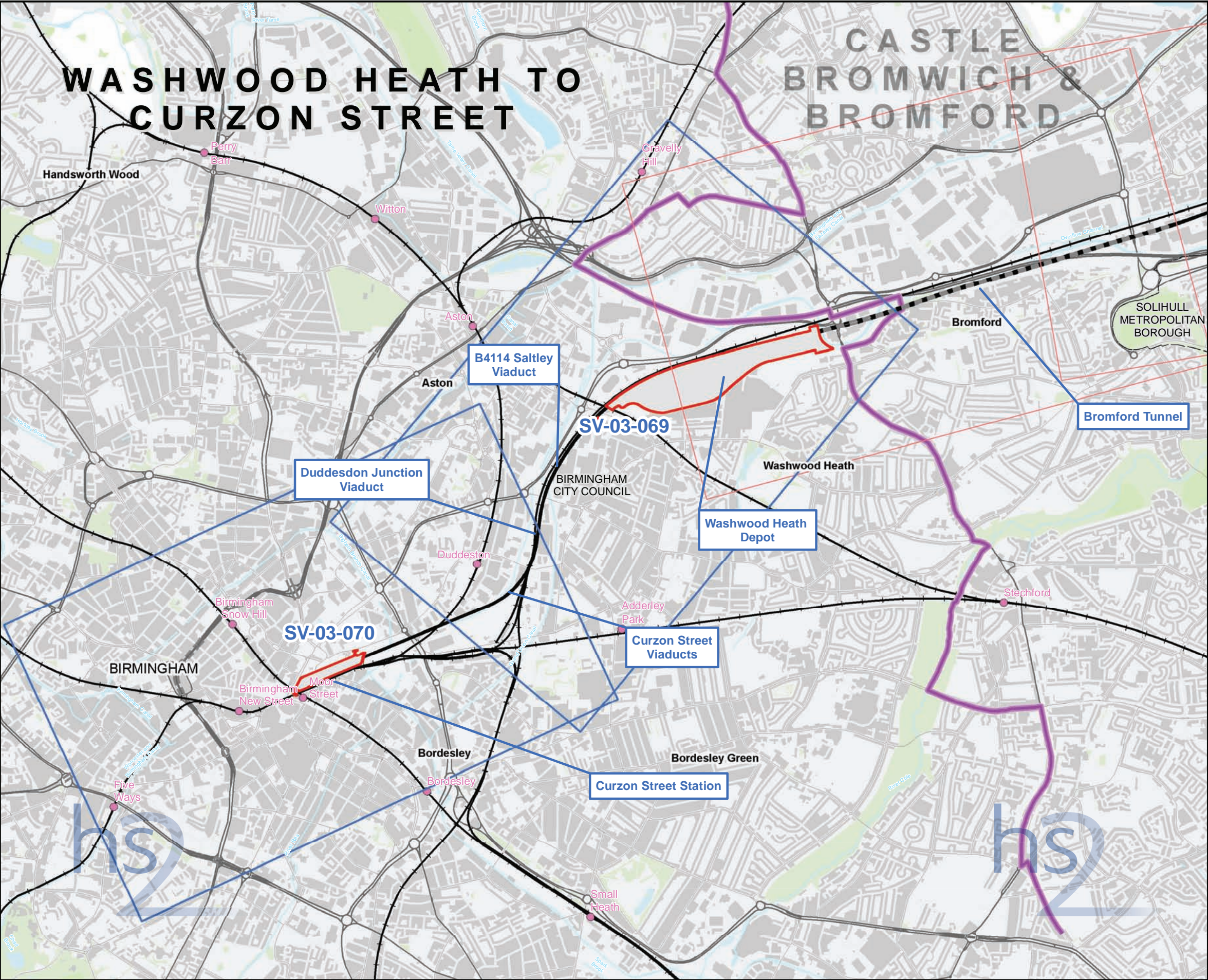
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Doc Number: C250-ARP-EV-MAP-000-003731

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Date: 31/10/13



Map Series Information:

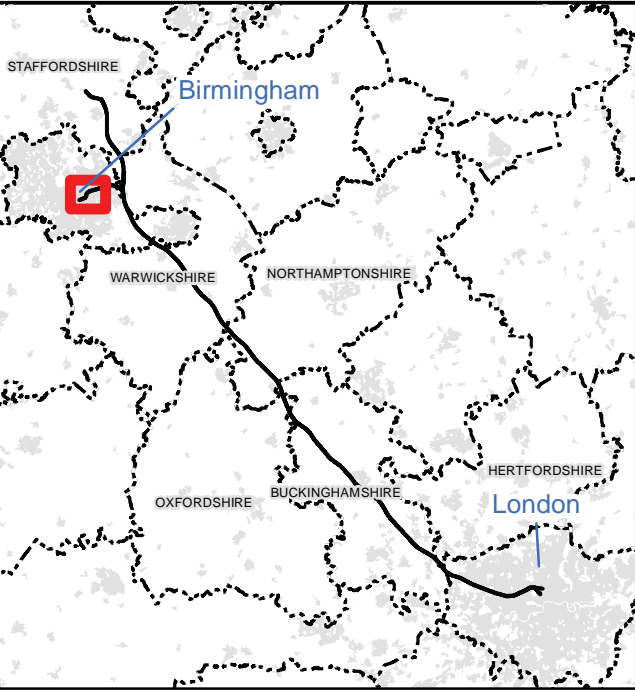
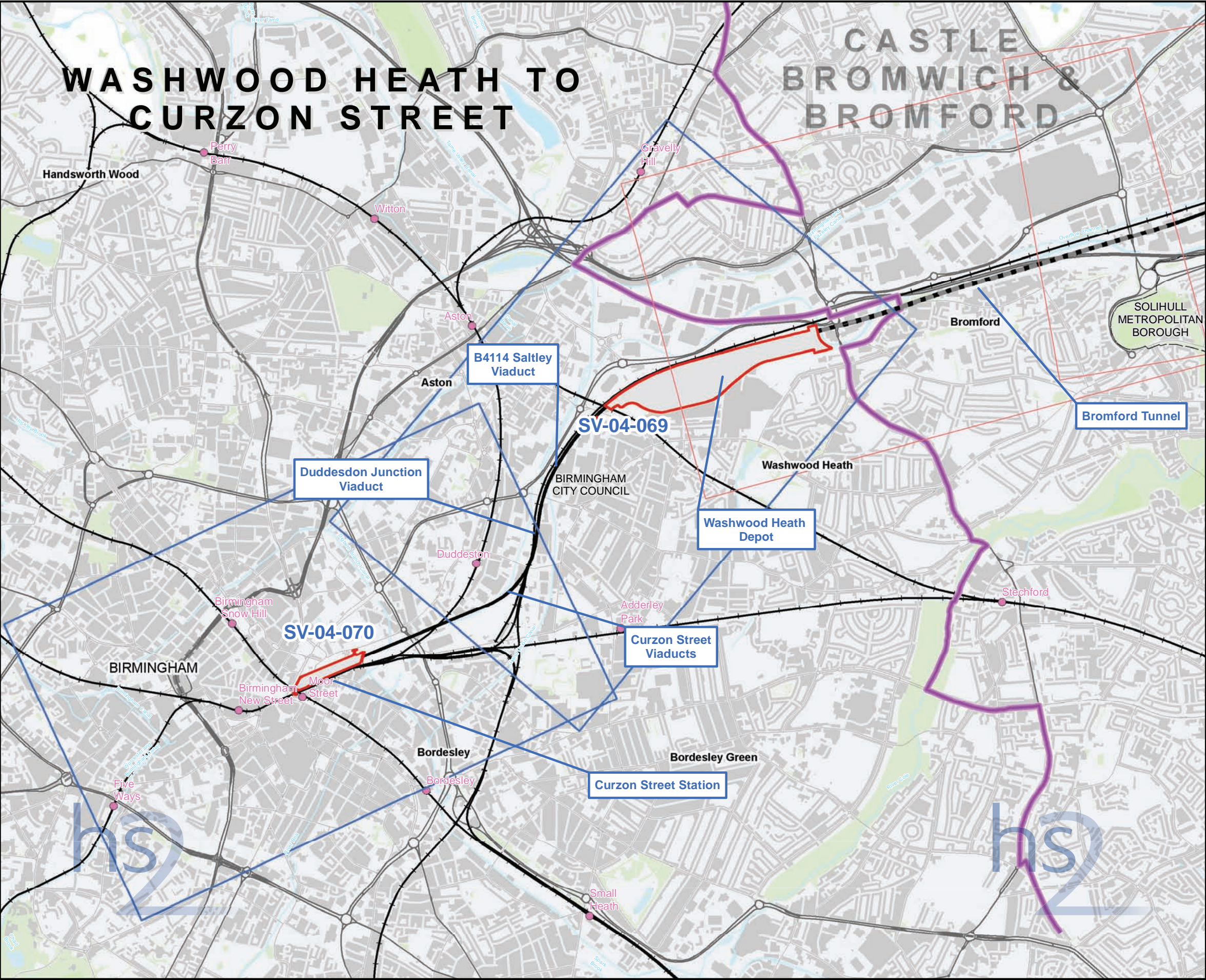
The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-003 and Volume 5: Appendix SV-002.

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend <ul style="list-style-type: none">Route in tunnelRoute on surfaceDepot, station, headhouse or portal buildingCommunity forum boundaryExisting railway stationCounty boundaryDistrict/Borough boundaryMap sheets included in this community forumMap sheets not included in this community forum	Map Number SV-03-INDEX-CFA26	<p>HS2 Ltd accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.</p> <p>Registered in England. Registration number 06791686. Registered office: Eland House, Bressenden Place, London SW1E 5DU.</p> <p>© Crown copyright and database rights 2013 Ordnance Survey Licence Number 100049190.</p> <p>Scale at A3: 1:30,000</p> <p>0 300 600 900 1,200 Metres</p> <p>Doc Number: C250-ARP-EV-MAP-000-004134-P06.00 Date: 29/10/13</p>
	Map Name Index Map of: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments	
	Community Forum Area CFA26: Washwood Heath to Curzon Street	



Map Series Information:

The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004 and Volume 5: Appendix SV-002.

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- Existing railway station
- County boundary
- District/Borough boundary

- Map sheets included in this community forum
- Map sheets not included in this community forum

Map Number

SV-04-INDEX-CFA26

Map Name

Index Map of:
Assessment and Monitoring Locations for
Operational Sound, Noise & Vibration Assessments

Community Forum Area CFA26:
Washwood Heath to Curzon Street

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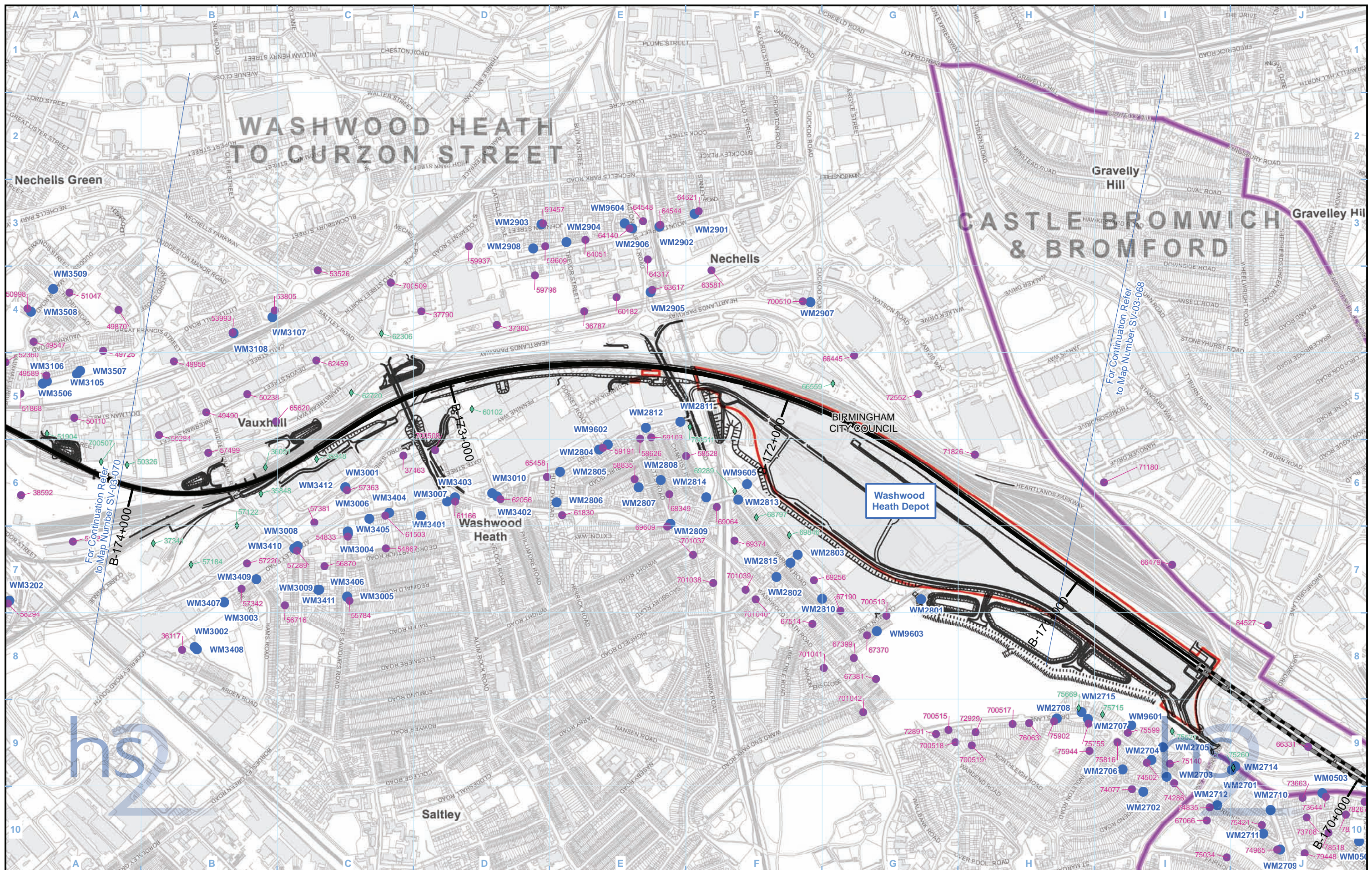
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Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
- Construction vibration assessment locations
- Construction airborne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see relevant Vol 5 Appendix SV-003)

(labelled with Measurement Location reference code)

Map Number

SV-03-069

Map Name

Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

Community Forum Area CFA26:

Washwood Heath to Curzon Street

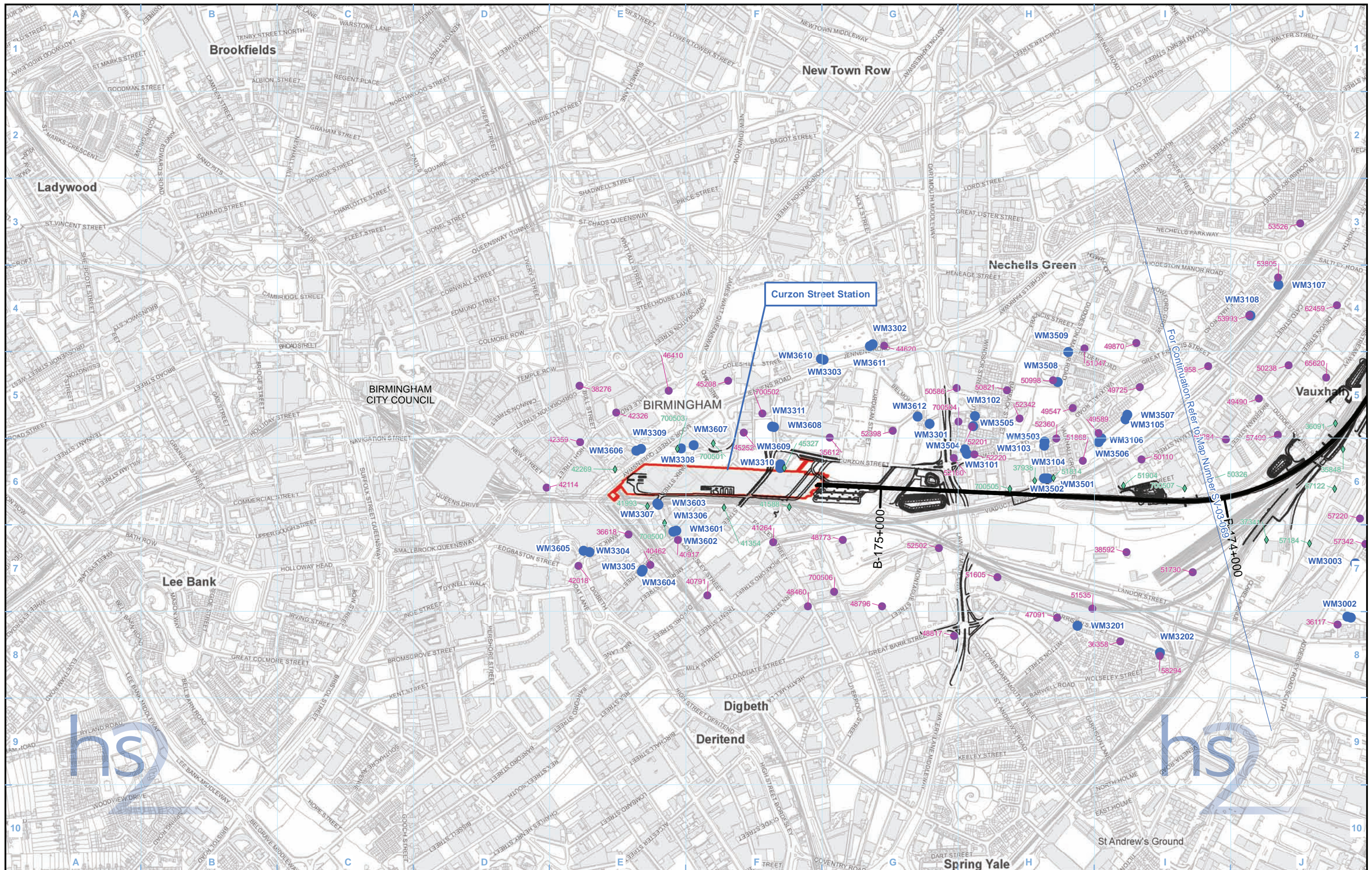
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Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
- Construction vibration assessment locations
- Construction airborne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see relevant Vol 5 Appendix SV-003)

(labelled with Measurement Location reference code)

Map Number	SV-03-070
Map Name	Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments
Community Forum Area CFA26: Washwood Heath to Curzon Street	

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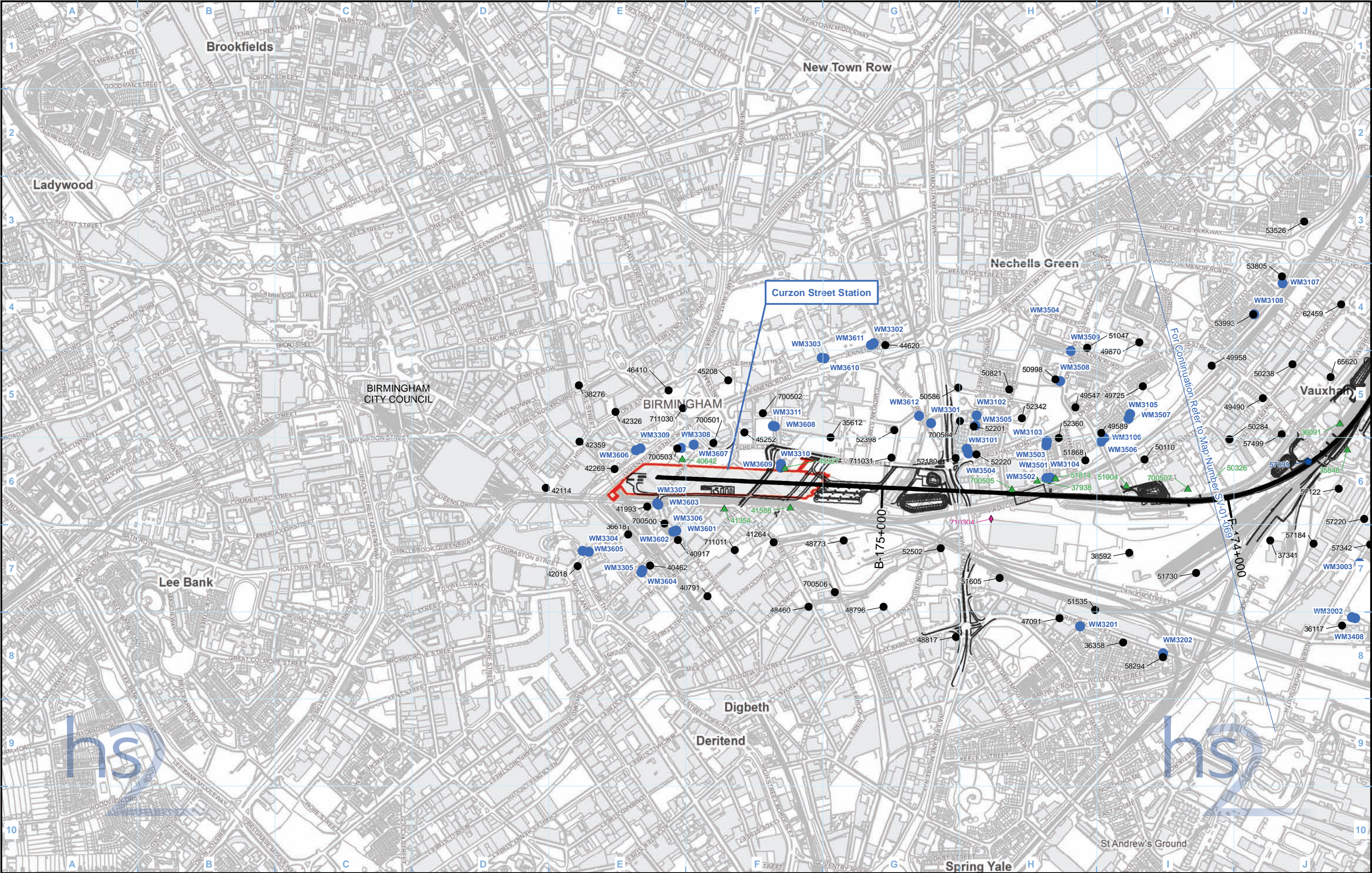
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Doc Number: C250-ARP-EV-MAP-000-003832

Date: 29/10/13



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV004)

(labelled with Measurement Location reference code)

Map Number	SV-04-070
Map Name	Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments
Community Forum Area CFA26: Washwood Heath to Curzon Street	

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